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WHITE PINE BLISTER RUST CONTROL

NORTHEASTERN REGION

CALENDAR YEAR 1953

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

GREENFIELD, MASSACHUSETTS

WHITE PINE BLISTER RUST CONTROL IN THE NORTHEASTERN REGION

ANNUAL REPORT FOR 1953

United States Department of Agriculture
Agricultural Research Service
Bureau of Entomology and Plant Quarantine
20 Sanderson Street
Greenfield, Massachusetts

FOREWORD

This report relates to activities during the calendar year 1953 in the control of the white pine blister rust disease in the Northeastern Region comprising the following 18 states; namely, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Tennessee, Kentucky, Georgia, North Carolina and South Carolina.

The program is operated by the Bureau of Entomology and Plant Quarantine, Agricultural Research Service of the United States Department of Agriculture, in cooperation with the department or agency in each state having statutory responsibility for the control of the disease, and with other federal land-owning agencies. As of January 1, 1953, the problem involved the effective and efficient destruction of ribes on a net control area of 17,995,846 acres, for the protection of the white pine on 7,258,390 acres.

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Statement of the Problem

The white pine blister rust disease was accidentally introduced into the northeastern States about 1900. Since then, the fungus has spread throughout the range of white pine in this region. The rust has been found in every state except Kentucky and South Carolina, and it probably is already there. Progress of infection in areas where control has not been established clearly indicates that young white pine stands cannot be brought to maturity in the presence of ribes, the alternate host plants without which the disease cannot spread.

Eight species of native ribes and many cultivated varieties are found in the Eastern States. Distribution of the bushes varies in density from scattered individual plants to large concentrations throughout most of the region. Ribes seed stored in the forest duff may remain viable for many years and bring about regeneration of these plants in areas disturbed by logging, fire, wind and other factors. Eradication of ribes is accomplished by uprooting the plants or killing them with chemicals such as 2,4,5-T.

Throughout its commercial range from Maine to Georgia, white pine is an important component of the forest. In many sections of New England, eastern New York, Virginia and North Carolina it is the most important forest tree and over large areas comprises the entire forest. White pine is a favored species in forest management and has been used extensively in reforestation.

White pine is a natural resource which contributes to the welfare of the region and the nation, economically, aesthetically and in watershed protection, irrespective of ownership. The blister rust problem is created by nature, and the cost of control is to a large extent dictated by nature's distribution of ribes. Present owners of young white pine stands, the timber crop of the future, have little incentive to invest money in protection knowing that financial benefits will not accrue during their lives. Because of the complexities of the problem, and the fact that loss of white pine would affect everyone, protection of this resource is chiefly a public responsibility.

Purpose of the Program

The purpose of the program is to establish and maintain control of the disease in white pine stands which need protection and give indication of sufficient value at maturity to warrant the cost. Selection is based on quantity, quality and age of pine. Seven and a quarter million acres of pine are designated for protection, approximately 60% of the total in the United States. In the Northeastern Region, about 15% of the pine is federally owned. Most of the remainder is distributed among more than 222,000 private owners. The control area (pine and protection zone), on which the ribes population is to be kept at a minimum until maturity of the trees is assured, covers approximately 18 million acres in the New England States, New York, New Jersey, Pennsylvania, Delaware, Maryland and the mountainous sections of Virginia, West Virginia, North and South Carolina, Georgia, Tennessee and Kentucky.

The immediate objective is to place at least 80% of the control [illegible] on a maintenance basis by 1955 after which control can be maintained indefinitely at approximately half present costs.

Values Involved

The present and potential stumpage value of white pine in the control area of this region is estimated at more than 500 million dollars. Eighty-five percent of this value is in immature growth needing protection until the trees can be harvested. These values are constantly being renewed as natural restocking of white pine occurs on cut-over areas, abandoned fields and pastures. During the period 1904 to 1947 inclusive, over 28½ billion board feet of white pine lumber was produced in the Northeastern States portion of the region, and an additional billion board feet in the Southern Appalachian States during the period 1928 to 1947 inclusive. The total economic value of white pine to New England alone has been estimated at 70 to 80 million dollars a year by the Federal Reserve Bank of Boston.

The value of white pine from the scenic and recreational viewpoint is probably at least equal to the commercial value for the production of wood products. The outstanding importance of white pine to the increasing recreational business in the region is demonstrated in the many stands of white pine which constitute the principal attractant in the youth camps, summer and winter resorts in countless numbers, and as scenic backgrounds along motor roads and in recreational areas visited by thousands of tourists annually.

There is abundant evidence of the destructiveness of the disease in the Northeastern States. Studies of selected areas in Maine, New Hampshire, Vermont and New York showed 45 percent of the pines dead or certain to die, representing at least 50 percent of the crop volume. In a study of mature stand at Waterford, Vermont, 73 percent of the crop pines were dead or sure to die as a result of the rust. The dead trees plus their potential increment represented a 48 percent decrease in volume. An additional 25 percent of the volume was in living pines with stem cankers. A recent study by the Forest Service of uncontrolled blister rust on a one-acre plot in Virginia indicated [illegible] percent of the pines dead and an additional 32 percent infected. Observations in several small areas in the Northeast have shown that nearly all white pine reproduction was killed within a few years. These examples, however, are not representative of average conditions.

The loss from blister rust in production of white pine lumber in the Northeastern States has been estimated at nearly 7 billion board feet with a stumpage value of 53 2/3 million dollars and a lumber value of $180 million. Application of control measures has saved at least an equal amount of white pine.

Cooperation

The blister rust control program in the Northeastern region is an outstanding example of cooperative effort against a plant pest. More than half the entire cost of the control project on state and private lands, not including cost of emergency programs, has been assumed by states and local cooperators. Since 1918, over 18,000 pine owners have contributed $[illegible], [illegible]

$1,120,899, counties $247,789 and states $[illegible]. In 1953, 15 states, 20 counties, 211 towns, and 21 individuals spent $[illegible] on control activities.

The Forest Service, Park Service and Indian Service have been consistent cooperators and have borne the complete cost of control operations on federally-owned lands.

The Bureau of Entomology and Plant Quarantine has provided leadership, technical direction and coordination to the entire program. In addition, the Bureau has paid part of the cost of cooperative control work on state and private lands.

Cooperation with foresters and other conservationists in public and private employment is steadily improving. There is much to be accomplished. Knowledge and recognition of the blister rust problem are important in management of white pine both from the standpoint of timber production and control of the disease. Efforts to bring about closer cooperation must be continued through demonstrations to forestry students and discussions in the field for mutual aid with practicing conservationists.

<u>Status of Program</u>

As of October 1, 1953 the control area in the Northeastern Region totaled 17,765,919 acres including 7,231,105 acres of white pine meeting standards for protection. Control had been established on [illegible]% of the control area and partial control on an additional 17.2%. Detailed mapping had been completed on 90.8% of the control area.

Under some conditions, control is established in one operation. In most cases one or more additional workings at 5-year intervals are needed to reduce the ribes population to the required minimum. Control can then be maintained through examination at less frequent intervals to locate and destroy any menacing development of ribes.

The size of the control area is not static since timber harvest, fires, wind storms, natural reproduction and planting of white pine frequently make additions or reductions necessary. Disturbances caused by fires, logging and wind often favor ribes regeneration and growth which may become a menace if not promptly destroyed. Examination work prior to scheduling of ribes eradication enables necessary adjustments in control area boundaries and location of danger spots. Particular need for this work exists in the Northeastern <u>States</u> where, due to the small units of land ownership, man-made changes occur more frequently. As the maintenance phase of the program approaches, examination work by trained personnel becomes of increasing importance in keeping protection costs to a minimum. Maintenance is a control condition where no further serious damage to white pine will occur, until disturbances by logging, fire, wind or other factors result in the restocking of ribes to a menacing degree.

Initial ribes eradication work is still needed on 1.6% of the control area, or 292,044 acres and about 3 million acres require examination and necessary rework prior to meeting maintenance status. The [illegible] acres

ance on maintenance will need examinations at 5 to 10-year intervals. Experience indicates that about 15% will require more intensive ribes eradication work to maintain control. Detailed mapping of approximately one million acres of control area is needed, largely in New Hampshire. It is expected that detail mapping will not be required in the remainder of the unmapped area. There will be a continuing need for some revision of regular control area maps to facilitate planning and execution of future control operations. Adequate field maps are essential to record effectively the locations where continued control efforts will be required and to indicate concentrations of ribes for future reference.

At the present rate of progress, control will be established on 90% of the control area by 1956. As control operations are constantly being extended to cover new areas of white pine, there is little possibility of ever placing more than 90% of the program on a maintenance basis. The blister rust disease cannot be eradicated. Therefore, control must be maintained as long as successive crops of white pine are desired.

The total direct and indirect costs of all phases of the control program to all agencies to date plus the estimated costs to 1968 represent [illegible]% of the present and potential value of the white pine in the control area of the region, or 8.3 cents per pine acre per year.

Accomplishments during the Year

Leadership

Over-all leadership, planning, coordination, technical and supervisory services were rendered through the Bureau staff of [illegible] members to almost three hundred cooperating agencies conducting control operations on federal, state and privately-owned white pine lands in [illegible] states and employing [illegible] seasonal workers at the peak of the ribes eradication season.

Ribes Eradication

During the 1953 field season, 694,714 acres were cleared of 3,770,103 wild and cultivated ribes by 78,269 man days of labor. In addition 310,930 acres of the area on maintenance were examined for ribes and found to be in need of no additional control measures at this time. The area on maintenance increased by 773,695 acres, or 5.7% as a result of 1953 control activities.

Special Control Work

Sanitation work for the protection of white pine reforestation stock was restricted to the environs of 6 nurseries in Massachusetts, New York, Maryland and West Virginia. Canker elimination work, to save pines with high aesthetic value, was restricted to state and municipally-owned lands in 10 towns in New York.

Surveys

In preparation for ribes eradication work [illegible] acres of control area were examined to determine need for mapping and/or ribes conditions. This resulted in a net reduction of 259,527 acres of control area and [illegible] acres of white pine. Initial mapping was performed on [illegible] acres and remapping on 497,071 acres. Surveys outside the control area to locate

new areas of white pine covered [illegible] acres. Time spent on this work totaled 7,126 man days, mostly during the fall and winter months.

Informational and Service Work

Informational and service activities by the leadership personnel involved attendance at local meetings, including participation in the deliberations of State Forest Practice Boards, Pest Control Committees, Soil Conservation District Committees and State and County Agricultural Mobilization Committees. Scripts for local news items and radio broadcasts were prepared. Demonstrations were arranged and displays shown at agricultural fairs and meetings. The motion pictures continued to be an important adjunct to informational work.

Service activities included thousands of personal interviews and follow-up calls and instructions in the field to many individuals. Instructions were given to students in forestry schools and contacts made with foresters, to enable them to more readily identify the disease, recognize the importance of blister rust control and the salvaging of infected pines, and to impress upon them the necessity for the adoption of cutting practices to keep ribes suppressed.

The effectiveness of informational and service activities is reflected in the local cooperation secured in 1953.

Publications

"Blister Rust Spot Infection Summary-Northeastern States", Final Report, June 30, 1953 (dittoed) - C. C. Perry

"Chronological Outline Summary of Developments in White Pine Blister Rust Control in the United States, 1906-1952", June 30, 1953 (dittoed) - compiled by C. C. Perry

"Control of White Pine Blister Rust in the Northeastern States" U. S. Department of Agriculture Program Aid Leaflet (PA) 231, August 1953 - C. C. Perry

Changes in Operations and Trends

The term "examination" is used rather broadly in the Northeastern Region to denote several activities which vary considerably in amount of work involved. Surveys outside the control area to locate pine; intense inspection of white pine stands to determine area covered, quality and size class of pine and width of protection zone, in connection with mapping; pre-eradication surveys to determine ribes conditions; and winter examinations of maintenance areas to locate disturbances have been classed as examinations. Each activity is necessary during some phase of the program, and the method used is important. These activities for reporting purposes are now designated as "Surveys". A further important change was made in 1953 in connection with examinations on maintenance areas to determine the need for further ribes eradication work. The practice had been to include as acreage worked, the entire area examined irrespective of whether ribes eradication was needed. This procedure was changed whereby only the

acreage actually cleared of ribes is reported in the ribes eradication totals for the season. Considerable attention has been given recently to the methods being used in determining need for further work on areas in the maintenance category after the lapse of from five to ten years.

A change was also made in 1953 which provided for the recording of maintenance acreage on which no further work will be needed. Such acreages are those on which examinations or workings have indicated soil and/or other natural factors preclude a menacing growth of ribes. Because of this, there will be little danger of ribes regeneration following disturbances, and therefore, such areas may be disregarded in planning and estimating cost of future work.

The use of 2,4,5-T in spraying concentrations of ribes is now approved practice in the region for the eradication of wild black, skunk and cultivated flowering currants. The results of spraying in 1951 and 1952 indicate unusual success. During 1953, approximately 100 separate concentrations of ribes were sprayed in New York. The chemical CMU was used experimentally on some species of ribes.

In New York, increasing use of the airplane has demonstrated the practicability of the examination of a great many scattered control areas at a great saving of time and effort. By this modern method, it is possible to not only discontinue acreages of white pine no longer meeting protection standards, but to locate new areas of reproduction that should be added to the control area.

In New Hampshire, upon the recommendation of the State Forester, a special pre-eradication survey to determine areas requiring ribes eradication is made prior to requesting town funds in any year.

Changes in Financing

Cooperative agreements were effected with the States of North Carolina and Tennessee, whereby they contributed toward the salary of a permanent blister rust control employee engaged in field work in both states during the fiscal year 1954. North Carolina agreed to pay $100 per month directly to W. A. Stegall, Jr., while Tennessee agreed to reimburse the Bureau for its share of the cooperative work up to $1,500.

Changes in Organization

Adjustments in organization during 1953 included a change in area leader personnel and responsibility in the New York-Pennsylvania Area. On March 1, Area Leader Kurtz was selected for service in grasshopper control on the Program of Agricultural Aid to Iran. He was succeeded on April 6 by W. V. O'Dell of the Gypsy Moth Control Project, with the provision that 75% of Mr. O'Dell's time would be devoted to blister rust control and 25% to gypsy moth control.

In connection with project planning for the future as the program approaches the maintenance stage, the services of District Leaders Brookway and Moore of Massachusetts were terminated on December 31, 1953. Each of these appointees served the project faithfully and commendably for more than

20 years. Southern New England will be combined into one district. District Leader Miller of Connecticut, a State appointee, will be assigned other work by the Connecticut Agricultural Experiment Station.

The 1953 session of the North Carolina General Assembly passed a Forest Insect Pest and Tree Disease Act which gives authority to the Department of Conservation and Development to handle tree disease problems. This resulted in the transfer of responsibility in the state blister rust control program from the State Entomologist in the North Carolina Department of Agriculture to the State Forester.

Effective November 1, 1953, the white pine blister rust control project was transferred from the Bureau of Entomology and Plant Quarantine to the U. S. Forest Service. By December 31, pursuant to this reorganization, the following actions were taken:

Regional Forester Charles L. Tebbe, Region 7, of the Forest Service, met with Director Roy L. Richmond, Region I, of the Bureau of Entomology and Plant Quarantine and Project Leader E. C. Filler at the Greenfield, Mass. office December 3, 1953. It was agreed that the project would continue to operate administratively under the Bureau until December 31, 1953. However, all personnel transfers became effective December 20, 1953. As of January 1, 1954, transfer of the project to the Forest Service was completed. The program will continue under the direction of E. C. Filler with headquarters at Greenfield, Mass. for the present.

Project and area leaders of blister rust control met at Philadelphia with Regional office personnel of Forest Service Region 7, December 11, 1953, for the purpose of getting acquainted and obtaining a general understanding of the operations of the several divisions.

Changes in Distribution of Pest

In the Northeastern Region, the progress of control is so far advanced that no extensive new areas of heavy damage are being found. Numerous examples were reported, however, of heavy infection in unprotected areas, but most of these were limited in extent. New infection has been noted in many instances where recurring ribes, due to disturbances from fire, logging and wind, have become a new menace. Infection on pine was found for the first time in Floyd County, Virginia in the fall of 1953.

Field Investigations and Their Effect on Program

A method of sampling areas placed on maintenance ten years ago to determine present need for ribes eradication work was further tested in Connecticut, Rhode Island and Massachusetts. Instead of the scouting method previously used, approximately three to six percent of the most likely ribes sites were checked. If few or no ribes were located the entire unit of control area was assumed to be in safe condition for another ten years. When dangerous concentrations were located by the sampling process a larger portion of the area was examined. The method was checked and found adequate for the conditions involved. Rate of coverage increased from 78 to 250 acres per man day.

Treatment of black currants and skunk currants with a solution of 2,4,5-T after the leaves have reached full growth (July to September) has proven effective and is now standard practice in eradicating large concentrations of these species. In the interest of lengthening the period of effective spraying work, skunk currants were treated in early May 1952. Results were successful as determined by examinations in 1953. Experimental work was undertaken with the use of the chemical CMU applied in powder form at the base of the bush. In New Hampshire spraying with ACP was also performed on an experimental basis. Results will be checked in the spring of 1954.

Several forest pathologists who have played an important role in previous pathological investigations were consulted as to the need for further studies on the pathology of the rust and ribes ecology which might result in more effective and economical methods of maintaining the control of the disease.

A new type of soil survey map gives promise of value in connection with the relation of some species of ribes, notably glandulosum and hirtellum, to soils.

Recommendations

It is recommended:

Bureau allotments for blister rust control in the Northeastern Region during the fiscal year 1955 be at least equal to those for the 1954 fiscal year. Operations at the present scale are required to reach the goal of a 90% maintenance program by 1956.

The four areas of the Region be reduced to three by adding Pennsylvania to the Southern Appalachian Area and adding New York and New Jersey to the present area comprising Vermont, Massachusetts, Rhode Island and Connecticut.

As vacancies occur in district leader positions, wherever practicable, no replacements will be made, but existing districts enlarged and assistants at lower grade provided to meet the situation.

In the important pine producing states, men qualified as scouts be employed on a permanent basis and paid either from state or federal funds. Such field workers are essential especially in maintenance operations.

A helicopter be assigned for use in examination and mapping of control areas in the early spring or late fall of 1954 to accelerate this work, especially in Maine and New Hampshire.

Uniform terms be adopted by all regions to designate blister rust control operations which have the same objective.

The Northeast Forest Experiment Station conduct investigations on relation of white pine management to the blister rust control problem in this Region.

Virgil D. Moss be assigned to this Region for the purpose of organizing and supervising studies in ribes ecology which might lead to better knowledge

concerning the longevity of ribes seed under natural conditions of storage and the factors which influence regeneration of ribes. This knowledge is essential to the development of forest management practices that will aid in control of the blister rust disease, and to the development of more economical methods of maintaining the control already established.

Extensive studies of blister rust damage to white pine be made in 15 towns of southeastern New Hampshire where R. hirtellum are abundant in numerous shallow swales. The high cost of initial eradication, the rapid regeneration of ribes from roots left in the ground and the small amount of damage to white pine observed in the early days of blister rust control resulted in deferment of work in these towns from 1936 to 1947. The policy regarding future blister rust control activities should be based on more accurate knowledge of the damage which has resulted from this one species of ribes growing under rather uniform site conditions.

An attempt be made to systematically collect, analyze, evaluate and record the observations and theories of district leaders and others with long experiences in ribes eradication work regarding distribution and growth of the various species of native ribes.

The Office of Exhibits construct a portable blister rust display similar to one made for use in the Appalachian Area, but approximately one-third the size and of lighter construction. Transported in a passenger car, it could be readily displayed in store windows, at meetings, fairs etc.

Changes in Federal and State Laws and Quarantines Affecting Program

There were no changes in Federal or State blister rust control laws and quarantines.

SECTION B

GENERAL STATEMENT

Importance of White Pine

The $7\frac{1}{4}$ million acres of white pine in the aggregate control area in the region represents 61% of the total pine acreage in the United States designated for blister rust protection work. The volume of mature pine amounts to over 10 billion board feet with a stumpage value of $145 million. In addition, the immature pine has an estimated potential volume of 45 billion board feet, worth $655 million. In the Northeastern States section of the region white pine is generally distributed in Maine and New Hampshire, but confined to rather well defined portions of the other states. In the Southern Appalachian section, white pine occurs chiefly in mixture with other species or as an understory in scattered areas along a strip from 3 to 8 counties wide in the western part of Maryland, Virginia and North Carolina, northern border counties of Georgia, in 3 counties in northwestern South Carolina, 21 counties in eastern Tennessee, 5 counties in east central Kentucky and 8 counties in eastern West Virginia. The largest stands of pure pine are located in North Carolina.

The most important contribution of the white pine forests is represented by the production of lumber. During the period 1904 to 1947, inclusive, over $29\frac{1}{2}$ billion board feet of white pine lumber was produced in the region. During the ten-year period from 1938-1947, inclusive, 46% of the total production of 16 billion board feet of white pine lumber in the United States, was produced in this region. In spite of the heavy drain that has taken place, current reports show a continuing comparable production. Reports from the field are replete with evidence indicating that timber harvesting is still big business. In Tamworth, New Hampshire, for example, the New England Forest Industries have set up a mill where they expect to saw 10 million bd. ft. in the next five years. All their cutting will be done selectively in accordance with good forestry practice. In the same town, the New Hampshire Forestry Commission has advertised $1\frac{1}{4}$ million bd. ft. for sale on the Hemenway State Forest, to be cut selectively. Most of it is white pine.

Stumpage prices continue to be attractive. A lot containing $\frac{1}{2}$ million bd. ft. of white pine in New Hampshire sold recently for $28.50 per M on the stump for medium quality timber. Recent sales of white pine stumpage in lots under the management of the New England Forestry Foundation in northern New England brought from $25 to $36 per M. The average price for stumpage in Warren and Essex Counties, New York was $15 per M with some prices ranging to $20 and $25 per M. In Venango County, Pennsylvania, it was reported that prices ranging from $25 to $35 per M are not uncommon. In the Southern Appalachian Area, the price situation was clearly expressed by the Richmond (Virginia) Times Dispatch in the following comment: "Timber is becoming more and more costly, more and more precious. Pine as it stood on the stump was bringing $1.50 to $2.00 per M bd. ft. in 1930 - today it sells from $45 to $60 per M."

The substantial production of lumber is indicative of the suitability of the lands in the region for the growing of white pine. Reports from all districts indicate an increasing amount of pine reproduction in cut-over areas, abandoned fields and pastures. Observations in the Southern Appalachians

show exceptionally rapid growth rates in many places. With the killing of the chestnut, white pine is becoming of increasing importance in the development of the forests in these states. The amount of pine is steadily increasing there through natural reproduction and increased interest in planting. The blister rust control program has helped materially in both phases of increase in the forest resource.

Interest in management of white pine is steadily increasing, in spite of the handicaps inherent in small-size ownership, and years needed to obtain a crop. In Maine, under the "Keep Maine Green" and "Tree Farm" programs over 900 woodlot owners are cooperating in some phase of woodlot management. In New Hampshire, the Forest Tax Law has stimulated interest by many owners, in forestry and good woodlot management. Operations under the Forest Practices Act in New York continue to be encouraging. The U. S. Forest Service is making a special effort to favor the regeneration and growth of white pine by selective cuttings especially on its lands in the Southern Appalachian States. Correlating control activities and cutting practices makes the control job easier and more effective. Marking timber with ribes regeneration in mind will materially reduce their come-back. Foresters feel that the Southern Appalachians will be one of the leading producers of white pine lumber in the future.

There is increasing evidence that such agencies as the New England Forestry Foundation, American Forest Products Industries, and many other forestry organizations, together with Extension, District, Farm and Consulting Foresters are convincing landowners of the benefits to be derived from better management of their forests, including protection against fire, insects and disease. District Leaders frequently comment regarding property owners salvaging infected white pines of commercial size as a result of advice from both public and private foresters. This demonstrates that progress is being made in securing a more cooperative interest from the forestry profession.

Interest in reforestation continues, especially in the Southern Appalachian States. While production of nursery stock by the Tennessee Valley Authority has been reduced, the State of Tennessee planned to plant 40 pounds of white pine seed in one of the State nurseries. In Maryland, the State Nursery at Harmon shipped $1\frac{1}{2}$ million white pines for planting. Nearly 300 Boy Scouts of West Virginia under the direction of Forest Service personnel, planted 40,000 white pine seedlings on the Monongahela National Forest in April. The planting was a part of "Operation Green Thumb", a program that eventually may result in the planting of a million trees each year. The Beckley, West Virginia, Rural Development Council reported plans for the planting of 102,000 trees of which 30,000 were white pine. The TVA planted two million trees in the spring of 1959 in 15 western North Carolina counties. Most of the trees were two-year white pine seedlings. Ribes distribution maps prepared by blister rust personnel in the Southern Appalachian Area are of great value to prospective planters of white pine.

In Virginia, the Conservation Department initiated the novel plan to provide each hunter applying for a license, a small packet of tree seeds to plant in the woods, the species depending on the conditions in the applicable locality. The Connecticut Conservation Department planned to adopt the idea.

The outstanding importance of white pine for its aesthetic value to the increasing recreational business in the region is demonstrated in the many stands of pine which constitute the principal attraction in the youth camps, summer and winter resorts, and recreational centers in countless numbers. In the Southern Appalachians, the white pine forests form scenic backgrounds along motor roads and in recreational areas in the Blue Ridge Parkway of North Carolina and Virginia, the Shenandoah National Park in Virginia, and the Great Smoky Mountain National Park in North Carolina and Tennessee.

Occurrence of Pine Infection

The disease was accidentally introduced into the Northeastern States at the turn of the century on shipments of imported white pine planting stock. By 1915 it had spread to native white pine and soon became general. In contrast to conditions in the Northeastern States, planting of imported infected stock was rather limited in the Southern Appalachian States. At the present time, infection on the pine host is generally distributed in counties in western Maryland, eastern West Virginia, western Virginia, and in a few counties in western North Carolina. It has been found in one county in northeastern Tennessee.

Ribes Eradication Work During 1953

Accomplishments in ribes eradication during the 1953 field season were highly creditable. Ribes were removed from 894,714 acres involving the removal of 3,770,103 ribes, as a result of 23,269 man days of labor. An area of 359,272 acres placed on maintenance from 5 to 12 years ago, was examined to locate disturbances and to destroy any threatening populations of ribes that might have developed. It was reassuring to find that only 13.4% of this maintenance acreage examined required ribes removal work.

As a result of the change in policy with respect to the recording of acreage on maintenance workings, it is not feasible to make a detailed comparison of the results of ribes eradication work in 1953, as compared with 1952. It should be pointed out, however, that if the former practice of including full acreage of all maintenance area examined, rather than the portion actually worked, the figure of total acreage covered in 1953 would be 1,206,694 as compared with 1,007,286 in 1952.

There was a substantial increase in the percentage of the net control area in the maintenance classification, from 75.0% in 1952 to 81.2% in 1953. The net control area in the region was reduced by 259,927 acres, through the discontinuance of areas no longer supporting white pine stands meeting standards, and through the reduction in width of protection zone borders. The reduction in pine area amounted to only 20,267 acres.

Of the total acreage worked, 13.4% represented first workings, 40.2% second, 41.0% third or other pre-maintenance workings, and 5.4% maintenance workings. Percentages of coverage by ownership classes were as follows: 96.9% state and private, 2.9% national forests and 0.2% national parks. Only 43.2% of the work in the Southern Appalachian Area was performed on state and private lands.

Status of Ribes Eradication Work

Over-all leadership, planning, coordination, technical and supervisory

service rendered through its [illegible] staff of trained workers to hundreds of cooperating agencies conducting control operations on federal, state and privately-owned white pine lands in 18 states has resulted in establishing control on [illegible] of the control area in the region. This accomplishment is represented by the figure of 14,472,783 acres currently in the maintenance classification. The disease is under partial control on an additional 17.2% of the control area. The attainment of these control accomplishments has involved the destruction of 356,100,278 ribes of which 353,704,211 were wild bushes and 2,396,067 cultivated.

Table 1 summarizes accomplishments in ribes eradication in the present net control area from 1918 to 1953 inclusive, by land ownership classes. Details by land ownership classes and by agencies are included in Table 21 in the Appendix.

Other Activities

An essential phase of the control program involves surveys and the examination of control areas to determine current conditions and the preparation of field maps showing the location of pine requiring control work, protection zone lines, ribes sites, etc., as a guide to eradication units. Detailed mapping in the Northeastern States had been completed on September 30, 1953 on 8,959,703 acres, representing 94.6% of the net control area in those states.

In the Southern Appalachian Area, mapping is designated as Survey Work. The survey work was completed in 1953, but there will be, of course, need for re-survey to keep up with normal changes in white pine distribution brought about by planting, natural reproduction, cutting, fire, etc.

In the Northeastern States, special work contributing to the control status has included the protection of white pine reforestation stock in 35 federal, state and commercial nurseries. A campaign to completely eliminate the especially susceptible European black currant required the inspection of nearly 1-3/4 million properties and the removal therefrom of 103,000 plants in 46,397 patches. A special blister rust canker elimination project on public lands resulted in the destruction of 288,861 fatally infected pines and the treatment of an additional 396,323 pines by the removal of 947,183 cankers.

Through informational and service activities the public has been kept fully informed and has responded commendably in support of and participation in the control program. In contact with forest owners, the project personnel has emphasized the importance of forest management and in particular has stressed selective cutting as an aid in preventing the regeneration of ribes. The personnel in the Northeastern States from 1922 to 1953 addressed 11,568 meetings, attended by 619,495 individuals. The press has been furnished 13,050 informative items, and 6,890 displays have been placed in store windows, at agricultural fairs or other places of public assembly. Motion picture films have been used effectively. Special courses of instruction have been arranged particularly in recent years at the several forestry schools. Information has also been disseminated to the general public by means of radio and television.

All of the above described activities have been designed to insure the future capacity of the white pine forests to add to the wealth of the region through products and service.

Table 1 - Net Ribes Eradication Work 1918-1963 inclusive
(September 30, 1963)

Land Ownership Class	Acreage of Control Area	Pre-Maintenance Acreage Worked			Maintenance Acreage		
		Once	Twice	Three Times	Total	Worked	No Work Needed
State & Private	15,829,766	15,543,204	7,472,060	2,348,288	12,568,464	1,062,817	4,315,338
National Forests	1,778,994	1,773,512	120,328	74,824	1,705,753	7,245	1,137,258
National Parks	156,714	156,714	19,782	11,260	148,101	3,228	95,258
Indian Lands	445	445	-	-	445	-	445
Total	17,765,919	17,473,875	7,612,170	2,432,352	14,422,763	1,073,290	5,548,299

Land Ownership Class	Percentage of Control Area				Percentage Area on Maintenance	
	Worked			On Mainten-ance		
	Once	Twice	Three Times		Worked	No Work Needed
State & Private	98.2	47.2	14.8	79.4	6.7	27.3
National Forests	99.7	6.9	4.2	95.9	0.4	66.7
National Parks	100.0	12.6	7.2	94.5	2.2	64.3
Indian Lands	100.0	-	-	100.0	-	100.0
Total	98.4	42.8	13.7	81.2	6.0	31.2

Methods Development

Constant attention has been given to reducing costs and increasing the effectiveness of control work. Among the notable accomplishments in this respect have been the general reduction in size of eradication crew units, the reduction of protection zone widths, the use of the drag-line system, the application of salt and borax for the eradication of bushes in difficult situations and the use of ribicides such as 2,4,5-T. Stress has been placed on the training of field personnel including the development of manuals of instruction. Special efforts have been devoted to increasing the efficiency of detailed mapping procedures, the devotion of time to the examination of control areas to determine present control needs, and most especially, the training of scouts to cope with the present situation where intensive crew work is no longer needed on extensive acreages. Another important illustration of the effort to increase the efficiency of the program relates to the assignment of personnel. The annual reports for 1950, 1951 and 1952 contain details regarding the adjustments since October 1950, coincident with the reorganization at that time.

The Continuing Problem

Although excellent progress in the control of the disease has been made, much remains to be done to insure adequate protection of the pine resources of the region. The continuing problem is challenging. Future requirements include the performance of first work on 1.6% of the control area, or 292,044 acres and reexamination to determine the need for rework on about 3 million acres not as yet in the maintenance classification. In addition, periodic examination at 5 to 10-year intervals chiefly to locate disturbed areas will be necessary on 8,874,464 acres of the area now on maintenance. It is estimated that the balance of 5,548,299 acres will not need further attention because of the non-ribes character of the sites. The examination of maintenance areas will involve yearly inspection and some remapping of 1/10th of the control area, but intensive ribes eradication will be required on only 15% of the areas examined.

About two million acres in the Northeastern States have never been initially detailed mapped. However, a considerable portion of the unmapped area is already on maintenance and mapping will be needed only on such portions as are designated eventually for rework. To cope with this continuing problem of examination, mapping, and ribes eradication, will require competence of the highest order, maintained through continued federal, state and local support.

Table 2 presents a regional summary by land ownership of 1953 ribes eradication accomplishments; and Tables 20 and 21 in the appendix show net data as of September 30, 1953. Similar data recorded by states and by operating agencies on an accumulative basis for the period 1918-1953 are in the omnibus tables and therefore are not included in this report.

Table 2 - Ribes Eradication Work by Agencies During [illegible]

First Working

Agency	Acreage Worked	Total Ribes Destroyed	Total Man Days	Ribes Per Acre	Acres Per Man Day
State and Private	116,892	931,354	4,116	8.0	28.4
National Forests	3,042	56,092	630	18.4	4.8
National Parks	50	500	4	10.0	12.5
All Projects	119,984	987,946	4,750	8.2	25.2

Second Working

State and Private	354,024	1,361,149	9,675	3.8	36.6
National Forests	5,251	33,528	772	6.4	6.8
National Parks	44	100	2	2.3	22.0
All Projects	359,319	1,394,777	10,449	3.9	34.4

Other Pro-Maintenance Workings

State and Private	354,189	989,797	7,093	2.8	50.0
National Forests	11,450	86,395	1,972	7.5	5.8
National Parks	1,480	15,180	177	10.3	8.4
All Projects	367,119	1,091,372	9,242	3.0	39.7

Maintenance Working

State and Private	42,141	273,227	3,076	6.5	13.7
National Forests	6,151	27,752	752	4.5	8.2
National Parks	-	-	-	-	-
All Projects	48,292	300,979	3,828	6.2	12.6

All Workings

State and Private	867,246	3,555,527	23,960	4.1	36.2
National Forests	25,894	203,767	4,126	7.9	6.3
National Parks	1,574	15,780	183	10.0	8.6
All Projects	894,714	3,775,074	28,269 (1)	4.2	31.7

(1) Includes 366 man days by District Leaders.

and district leaders to keep federal, state and local agencies and the general public fully informed about the disease, the importance of its control, the progress made toward attaining control, and to secure and maintain cooperative participation in the control program. This type of leadership activity is especially significant in Maine, New Hampshire, Vermont and Connecticut where towns assist in financing control work and in New York where counties add their financial support. The importance of this assistance is indicated by the fact that cities, towns, counties and individuals provided 26.2% of the cooperative money in 1953. These funds added to the state contributions account for 52.1% of all cooperative and Bureau money expended for the program in 1953.

From October 1, 1952 through September 30, 1953 the leader personnel participated in 183 meetings with an attendance of 10,611 persons. In addition, meetings included participation in the proceedings of Forest Practice Boards, Pest Control Committees, Soil Conservation District Committees, and State and County Agricultural Mobilization Committees. There were 25 radio talks and 165 items were prepared for local publication. In addition, 83 exhibits or demonstrations were placed at fairs or sectional or national meetings. Instruction and demonstrations to students at the forestry schools in the region were continued with success. During 1953, the institutions visited included, the University of Maine, the University of New Hampshire, Paul Smith's College in New York, the New York Ranger School, the New York State College of Forestry, the Pennsylvania State College of Forestry, and the Virginia Polytechnic Institute. The blister rust motion pictures were not used quite as generally as heretofore, but continued to be an important adjunct to informational work. There were 86 showings of the films to an aggregate audience of 9,632 persons.

Service activities included 3,842 initial interviews, 2,350 follow-up calls, and instructions given to 2,284 persons. Contacts, as heretofore, were made with practicing foresters - federal, state, county, farm, extension and consulting - to enable them to more readily identify the disease, recognize the importance of blister rust control and salvaging of infested pines, and adopt cutting practices to keep ribes suppressed.

The informational and service activities resulted in [illegible] towns in Maine, New Hampshire, Vermont, Massachusetts, Connecticut and New York contributing a total of $62,961 for control work during 1953. One county in Maine and 19 counties in New York appropriated $22,485. In addition, 21 individual owners in the Northeastern States contributed $1,144 for wild ribes eradication work on their lands, and hundreds of other owners of cultivated ribes permitted their bushes to be destroyed without compensation.

A detailed record of informational and service activities during 1953 is shown in Table 3. An accumulative record of such activities in the Northeastern States only, for the period 19[illegible]2-1951 will be found in Table 32 of the 1951 annual report.

A record of local cooperation during 1953 is provided in Table 4 and accumulative totals for the period 19[illegible]3-1953 are shown in Table 5.

CHART I

PERMANENT BLISTER RUST CONTROL PERSONNEL IN NORTHEASTERN REGION - DECEMBER 31, 1953

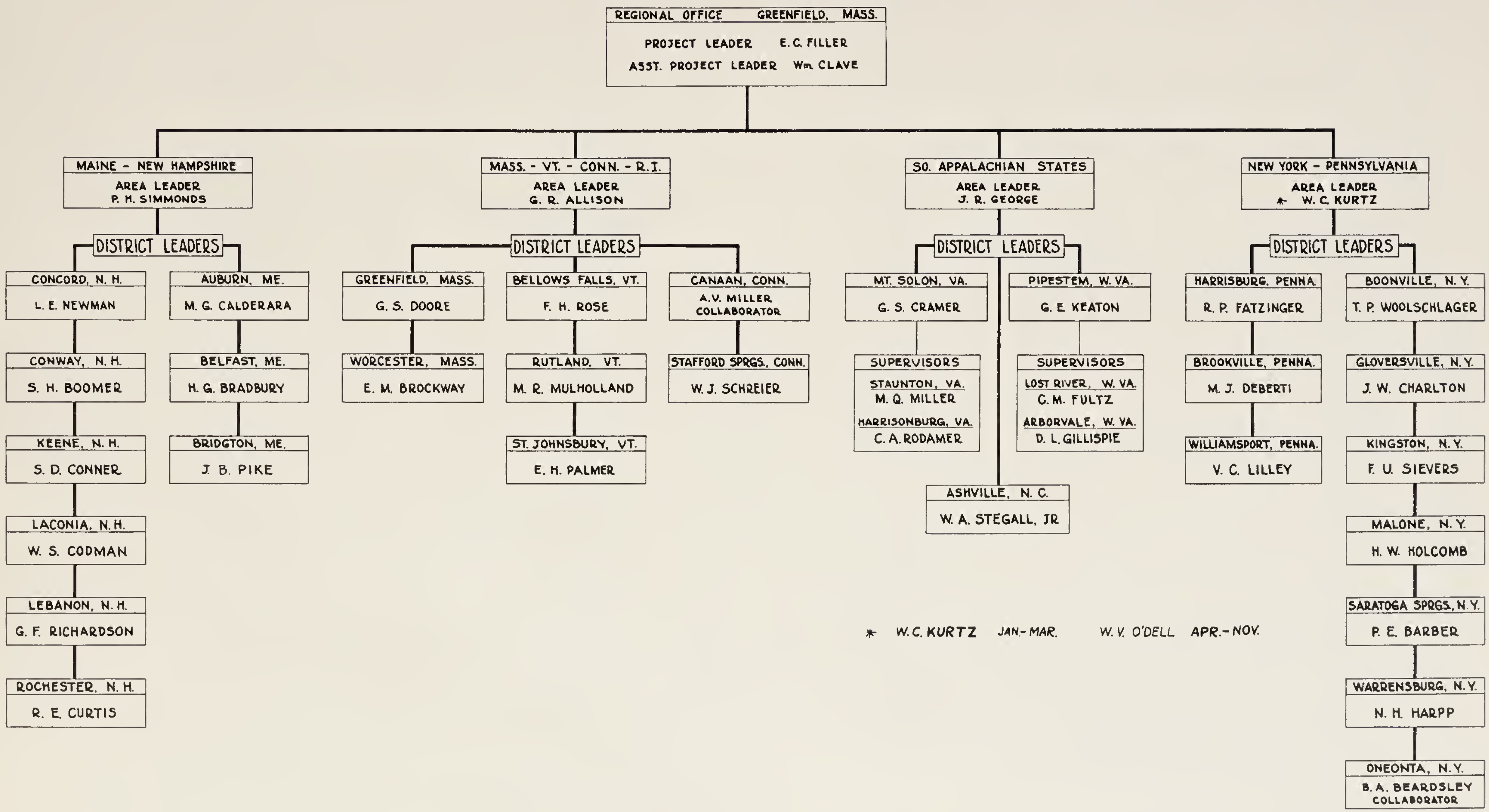

Table 3 - Informational and Service Activities of Blister Rust Control Leaders During 195[illegible] - Northeastern Region

Informational Activities

State	Meetings Addressed		No. Radio Talks	No. Issues Published	No. Demonstrations Placed
	No.	Attendance			
Me.	11	533	0	2	3
N. H.	46	2,857	0	74	17
Vt.	29	793	9	21	17
Mass.	0	0	16	10	12
R. I.	2	2	0	0	2
Conn.	2	2	0	0	2
N. Y.	75	5,567	0	44	9
Pa.	2	165	0	8	3
N. Car.	2	9	0	0	4
Tenn.	5	441	0	0	5
Va.	3	74	0	2	8
W. Va.	6	168	0	4	1
Total	183	10,611	25	165	83

Service Activities

State	No. Initial Interviews	No. Follow-up Calls	No. Individuals Instructed in Field
Me.	841	490	571
N. H.	529	771	321
Vt.	393	523	78
Mass.	871	206	54
R. I.	14	0	6
Conn.	116	52	85
N. Y.	934	788	746
Pa.	144	20	423
	(Data lacking for So. Appalachian Area)		
Total	3,842	2,850	2,284

Table 4 - Local Cooperation on Blister Rust Control Work During 1953

State	No. of Cooperators			Amount Expended			
	Indi- viduals	Towns	Counties	Indi- viduals	Towns	Counties	Total
Maine	1	68	1	$ 12	$ 17,855	$ 101	$17,968
N. H.	2	108	-	397	36,020	-	36,417
Vt.	3	29	-	237	5,813	-	6,050
Mass.	14	3	-	345	1,933	-	2,278
Conn.	1	2	-	150	750	-	900
N. Y.	-	1	19	-	590	22,384	22,974
All States	21	211	20	$ 1,141	$ 62,961	$ 22,485	$86,587

Table 5 - Local Cooperation on Blister Rust Control Work 1918-1953 Inclusive

State	Individual Cooperation		Town Cooperation			County Cooperation	
			No. Towns				
	No. Cooperators	Amount Spent by Individual Cooperator	Approp- riations	Contri- butions	Amount Town Money Expended	No. County Appropria- tions or Allotments	Amount Spent by Counties
Maine	11,132	$ 86,110	1,368	20	$ 250,218	1	$ 101
N. H.	702	51,219	2,309	20	725,099	6	1,724
Vt.	2,385	77,553	329	64	85,572	-	-
Mass.	21,975	119,354	8	65	28,358	-	-
R. I.	8	581	-	-	-	-	-
Conn.	527	12,670	159	52	41,338	-	-
N. Y.	5,990	177,157	30	3	10,013	207	240,964
Pa.	303	2,273	-	-	-	-	-
Va.	1	276	-	-	-	-	-
W. Va.	1	358	-	-	-	-	-
Total	43,024	$ 527,551	4,203	224	$1,140,598	214	$ 242,789

Publications and Reports

Items published during 1953 are listed in Section 2 of this report.

Special reports prepared included statistics regarding further program requirements, need for further investigations on ribes ecology, and an estimate of control work needed during the next 10 years in the New York-New England area. This latter report was prepared at the request of the U. S. Forest Service.

Cooperation with Other Agencies

Assistant Project Leader Clave accompanied two foresters of the Provincial Department of Lands and Forests, Ontario, Canada, on an extended field trip in New York, Maine and New Hampshire from July 27 to August 7. Opportunity was given to observe all phases of the control program. The Canadian foresters were impressed by the apparent success of the program as evidenced by the scarcity of infection on white pine, as compared with conditions outside the control area. Information on ribes species in the Southern Appalachians and regarding location of white pine stands outside their natural range was furnished the Southern Research Station in Ontario. Interest in blister rust control is on the increase in the Maritime Provinces. A supply of field manuals was furnished four district foresters in Nova Scotia and the forester of the Forest Pathology Laboratory in New Brunswick.

Aeciospores were collected in Maine, New Hampshire and West Virginia for use at the Lake States Forest Experiment Station, St. Paul, Minnesota.

Greenfield Project Office leader personnel attended the Northeastern Forest Tree Improvement Conference in Williamstown, Massachusetts, and collaborated in the program of the Northeastern Forest Pest Committee in Boston, Massachusetts in March and at Stowe, Vermont in September.

Area Leader Allison was active in making arrangements for a leadership Workshop for Department of Agriculture employees in the Northeastern area, for Training in Administrative Management. Tentative plans call for sessions in Boston, Massachusetts in February 1954.

In August, at the request of the New Haven Office of the Division of Forest Insect Investigations, six district leaders from Maine, New Hampshire, Vermont and New York were instructed regarding the inspection of red pine to determine the presence of the Matsucoccus Scale. These leaders made inspections of native red pine stands in their respective districts. No evidence of infestation was found.

Cooperation with the gypsy moth control project included assistance by district leaders in Maine, New Hampshire and Vermont in the inspection of Christmas trees and greens during the past season. District Leader Pike aided in the gypsy moth appraisal of damage study by identifying locations of early defoliation in Maine. C. C. Perry participated in the preparation of Appraisal Program reports and manuscripts for later publication. He was in charge of an elaborate Bureau exhibit at the Eastern States Exposition in West Springfield, Massachusetts in September.

The supervisor in West Virginia assigned to the [illegible] control project and another supervisor in the same state, aided in a [illegible] program for the control of rabies.

Nine project trucks were loaned to the U. S. Post Office authorities during the Christmas mailing season; four in Saratoga, New York, three in Virginia, one in West Virginia, and one in North Carolina.

The district leaders in Massachusetts, New Hampshire, Maine and Vermont made contacts with the foresters of the New England Forestry Foundation in order to keep them informed of control activities and procedures.

Regional Leader Filler served as A.R.A. member of the Rhode Island Agricultural Mobilization Committee, a member of the Executive Committee, Northeastern Forest Disease and Insect Control Committee, member of the B.E.&P.Q. Northeastern States Regional Wage Board, and alternate member of the New Hampshire Agricultural Mobilization Committee.

Assistant Project Leader Clave functioned as an alternate member of the Massachusetts Agricultural Mobilization Committee.

Area Leader Allison served as a member of the Connecticut Agricultural Mobilization Committee.

The district leaders were members of organizations as listed below:

E. M. Brookway (Massachusetts)	:	Worcester County Agr'l. Mobilization Committee
M. G. Calderara (Maine)	:	"Keep Maine Green" Committee for Andrescoggin Co.
R. E. Curtis (New Hampshire)	:	Stafford County Agr'l. Mobilization Committee
S. D. Conner (New Hampshire)	:	Cheshire County Agr'l. Mobilization Committee
J. W. Charlton (New York)	:	Forest Practice Board for District No. 10
H. W. Holcomb (New York)	:	Franklin Co. Defense Mobilization Committee Franklin Co. Land Use Committee
Supervisor Keaton (W.Virginia)	:	Forestry Commission, Berkley Rural Development Council

Surveys

Examination of control areas in advance of scheduled eradication workings is designed to provide an opportunity for the re-appraisal of pine values and the adjustment of map records, or actual remapping when necessary. This activity, carried on during the fall and winter months, is essential to efficient planning of ribes eradication work and provides assurance that only pine areas meeting standards for quality and quantity will be scheduled for such work. This activity also permits the examination of areas on maintenance to determine where disturbances have occurred and whether ribes have persisted or regenerated. During 1953 there was an increase in this dual activity in that 7,126 man days were utilized as compared with 5,[illegible] man days in 1952. This represented an increase of 33%. Less mapping or remapping was necessary as is indicated in the figure of [illegible]8,719 acres in this category, a decrease of 10.5% from 1952.

Continued use of the airplane in examination work speeded up such work in New York. An aerial survey in Westchester and Columbia counties was completed at great savings in time. In the former county, 28% of the control area was discontinued as a result of observations from the air. In St. Lawrence and Franklin counties, approximately 225 square miles of wild land were examined for pine in three hours of flying time. In the towns of Athens, Coxsackie and Schodack as a result of aerial observations and ground checking where necessary, there was a net reduction in control area of 3,289 acres. Actually, however, considerably more of the old area was discontinued, but it was replaced by new areas of natural reproduction. Similar work is needed in many parts of the region, especially in New Hampshire.

Instructions stressing procedure for keeping a separate permanent map record of maintenance work activities were issued in July.

About 90% of the control area in the region has been detail mapped. A large part of the remaining portion will not need such mapping since the location and extent of the areas are definitely known or no maintenance workings will be required because of the absence or scarcity of ribes when initially worked.

The net reduction in total control area in 1953 was 229,927 acres with a net reduction of 20,287 acres in pine area.

The results of examination and mapping work in 1953 are summarized in Table 6. The accumulative results in the Northeastern States from 1918-1951 were recorded in Table 34 in the 1951 annual report.

Table 6 - Surveys During 1953

State	Acreage Within Control Area				Acreage Examined Outside Control Area	Total Man Days
	Examined for any Purpose	Initially Mapped	Remapped	Total Mapped		
Maine	118,619	17,090	58,182	75,272	144,883	702
N. H.	278,845	82,042	47,502	129,544	49,417	1,644
Vt.	59,722	10,933	7,239	18,172	174,944	316
Mass.	255,567	2,749	129,978	132,727	35,873	436
R. I.	37,854	-	19,539	19,539	20,165	235
Conn.	118,071	-	55,877	55,877	170,236	504
N. Y.	355,633	40,790	138,372	179,162	168,146	1,936
Pa.	104,518	5,685	20,651	26,336	7,995	357
Md.	550	404	-	404	-	5
N. Car.	6,633	-	892	892	600	290
Tenn.	7,475	-	1,404	1,404	3,440	23
Va.	133,521	455	8,280	8,735	27,900	387
W. Va.	37,906	1,500	9,155	10,655	-	291
Total	1,514,913	161,648	497,071	658,719	803,599	7,126

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATELY-OWNED LANDS

The Bureau of Entomology and Plant Quarantine is responsible for over-all project planning and expends money appropriated by Congress under the provisions of the Lea Act for control work in cooperation with the states. These federal funds are used in participation with states, counties, cities, towns, associations and individual pine owners. Nearly 85% of the white pine in the control area is on state and privately-owned lands.

State and Local Cooperative Expenditures

State funds were appropriated specifically for blister rust control in 1953 in Maine, New Hampshire, Massachusetts, Connecticut, New York and West Virginia; while in Vermont, Rhode Island, Pennsylvania, Maryland, Virginia and West Virginia, allotments were made from regular state appropriations for either general forestry or pest control projects. The State of Maryland stepped up its participation by providing additional financing during the year. The 1953 session of the West Virginia legislature appropriated $10,000 for work during the next biennium. Total state expenditures and contributed services (direct and indirect aid) during 1953 amounted to $243,440 compared with $223,436 in 1952.

Town cooperation in Maine, New Hampshire, Vermont, Massachusetts, Connecticut and New York involved expenditures of $62,961 for cooperative ribes eradication work by 211 towns as compared with $68,670 by 221 towns in 1952.

County cooperation was confined to Maine and New York. In Maine, a precedent was established when the Oxford County Commissioners made available $1,400 for work in the unorganized towns of Albany and Milton Plantation. This was to finance a program over a two-year period. In New York 19 counties expended $22,384. The grand total of $22,485 compares with $22,505 in 1952, entirely in New York.

Individuals expended $1,144 for specific control work on their holdings. These expenditures were made by 21 owners.

A summarization of the individual, town and county cooperation by states is in Table 4.

During 1953 total state and cooperative expenditures and contributed services for work on state and privately-owned lands amounted to $330,027, compared with $317,981 in 1952.

A record of accumulative local cooperation from 1918 to 1953, inclusive, is shown in Table 5.

1953 Accomplishments in Ribes Eradication on State and Private Lands

During the 1953 field season 3,550,673 ribes (wild and cultivated) were removed from 387,246 acres by 23,960 man days of labor.

First work accounted for 13.5% of the total acreage worked, second work

10.8%, other pre-maintenance workings 40.9% and maintenance workings 4.9%.

Although the average number of ribes per acre was low, it results from the fact that there was a large acreage with low ribes population intermingled with denser populations in concentrations. Such a situation serves to reduce the average.

The production rate (acres per man day) amounted to 28.4 for first work, 36.6 for second work, 49.9 for other pre-maintenance work, 13.7 for maintenance workings, and 36.2 for all work.

The details of the results of eradication work on state and private lands are contained in Table 7.

Maintenance Workings

All ribes eradication work in Connecticut and Rhode Island was in the maintenance working category. In the other New England states the amount was small, but in Pennsylvania acreage of maintenance workings represented 25.1% of the season's work. In the Southern Appalachian Area, there were no maintenance workings in Maryland, North Carolina and Tennessee, but 40.0% of all work in Virginia was on maintenance areas. In the region, maintenance workings constituted 5.4% of the grand total of the acreage covered, while on the basis of man days, it amounted to 13.5% of the grand total. Attention is called to the fact that starting this year, reports of maintenance workings include only those areas on which ribes eradication was performed.

In the Appendix, the results of maintenance workings are shown in Table 18, and accumulative data from 1946-1953 inclusive are given in Table 19.

Comparison of 1951, 1952 and 1953 Ribes Eradication Results

As a result of the change in policy with respect to the recording of acreage on maintenance workings, it is not feasible to compare the results of 1953 ribes eradication work with that accomplished in 1951 and 1952. With respect to production rates, however, the figures below show such a comparison in the first and second workings.

Production Rates (Acres per Man Day)

	First Work	Second Work
1951	16.4	27.2
1952	20.4	29.5
1953	28.4	36.6

These figures indicate that the greater use of scouts where competent men are available and the use of smaller crew units is resulting in a commendable increase in production rates.

Checking Ribes Eradication Work

Three procedures are used in checking ribes eradication in the region.

Table 7 - Ribes Eradication Work on State and Private Lands During 1953

State	First Working			Second Working			Other Pre-Maintenance Working			Maintenance Workings			All Workings		
	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days
Maine	10,028	57,913	388	71,126	243,038	1,619	86,386	265,344	1,679	651	23,413	135	168,191	589,708	[illegible]
N. H.	11,726	222,043	538	160,886	532,674	2,942	61,331	198,187	983	3,379	37,478	259	237,321	990,382	[illegible]
Vt.	36,032	111,483	1,029	11,226	34,379	313	3,903	10,113	112	924	10,518	65	52,085	166,493	[illegible]
Mass.	16,525	13,052	133	30,395	27,078	456	54,407	69,146	630	433	3,399	14	101,760	112,675	[illegible]
R. I.	-	-	-	-	-	-	-	-	-	-	194	-	-	194	[illegible]
Conn.	-	-	-	-	-	-	-	-	-	303	17,962	24	303	17,962	[illegible]
N. Y.	35,822	267,777	1,525	68,221	414,806	3,175	133,295	392,344	2,920	19,393	72,605	750	254,731	1,147,532	[illegible]
Pa.	7,025	18,985	205	7,199	43,063	471	10,591	23,083	295	8,455	45,160	850	33,270	130,291	[illegible]
Md.	404	232,165	160	180	1,219	39	217	650	32	-	-	-	801	234,034	[illegible]
N. Car.	-	1,378	1	-	-	-	-	-	-	-	-	-	-	1,378	[illegible]
Tenn.	-	-	-	88	1,327	11	30	276	3	-	-	-	118	1,603	[illegible]
Va.	1,330	6,558	137	1,705	44,253	256	812	16,182	164	7,628	59,444	1,094	11,475	126,437	[illegible]
W. Va.		-	-	2,998	19,312	393	3,217	14,472	275	975	3,054	95	7,190	36,835	[illegible]
Total	116,392	931,354	4,116	354,024	1,361,149	9,675	354,189	989,797	7,093	42,141	273,227	3,076	867,249	3,555,527	[illegible]

State	Acres Per Man Day	Per Acre Values	
		Man Days	Ribes
Maine	44.0	.023	3.5
N. H.	50.3	.020	4.2
Vt.	34.3	.029	3.2
Mass.	82.3	.012	1.1
R. I.	-	-	-
Conn.	12.6	.079	59.3
N. Y.	30.4	.033	4.5
Pa.	20.5	.049	3.9
Md.	3.5	.288	292.2
N. Car.	-	-	-
Tenn.	8.4	.119	13.6
Va.	7.0	.143	11.0
W. Va.	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

These are (1) observations by the foreman as he works with the field unit and virtually examines the ground covered by the unit, (2) rework of a portion of a strip by the field unit itself, and (3) measured general checks of worked area by the district leader or checker, on strips $8\frac{1}{4}$ feet wide in forest and brush areas and $16\frac{1}{2}$ feet wide in open types such as pastures. In addition, supervisory personnel make general inspection of worked areas and observe the functioning of the field units to make certain that proper procedures are being used.

Measured checking, while a highly desirable type, is time-consuming. Where leaders have assistants for the purpose as in New York, a substantial number of such checks can be made. On the other hand, where the leaders do not have assistance, reliance has to be placed in great measure on the supervisory type. This will be particularly the case as maintenance work increases and individual work areas become numerous and in scattered units of smaller acreage.

Chemical Eradication of Ribes

The 1953 inspections of the results of the treatment of ribes with 2,4,5-T indicated general effectiveness, with very few seedlings appearing in the treated areas. It appears, however, that stronger formulations will be required for the eradication of red currants and gooseberries. Reports indicate that spraying operations have been effective throughout the leaf-bearing season.

There was an increase in the use of 2,4,5-T as a ribicide during 1953. In New York, approximately 100 separate concentrations of ribes were sprayed at the rate of 3/4 gallon to 100 gallons of water. The concentrations ranged in size from 600 sq. ft. to more than one acre. The 19.4 acres contained an estimated population of 121,867 ribes. In one district in New Hampshire, the chemical in a summer oil mixture was applied to concentrations on 39.5 acres to destroy an estimated population of 134,900 ribes, chiefly smooth gooseberries and skunk currants. In Massachusetts, 4.2 acres were sprayed. It was estimated that 30,800 ribes, chiefly skunk currants were destroyed. In one district in Maine, an estimated population of 55,000 ribes on 34 acres was destroyed. In other districts in these states and in other states in the region this time-saving and effective method of ribes eradication was carried on to a limited extent.

The chemical CMU applied as a powder at the base of the bush was used on an experimental basis. Spraying with MCP was performed, also experimentally. The ultimate effectiveness of these two chemicals as ribicides will be evaluated through observations in the spring and summer of 1954.

Salt-borax treatment is still practiced on a considerable scale in all states, for the eradication of large ribes in stonewalls or other locations where hand-pulling is difficult and ineffective. In New York alone, 2,300 pounds of the mixture in two and four ounce doses were used. In Pennsylvania, the use of 191 pounds was reported.

Ribes Eradication Field Units

The use of ribes eradication field units of smaller size conforming with

control needs was again emphasized during 1953. Where practicable, the drag-line method of searching for ribes was used effectively. The urgency of a few full-time skilled workers continues to be an important requisite.

Nursery Sanitation Work During 1953

Sanitation work was performed in the environs of 6 nurseries in Massachusetts, New York, Maryland and West Virginia. A total of 22 man days was spent examining 3,651 acres and 501 ribes were located and destroyed.

A list of nurseries maintaining sanitation zones is given in Table 8.

Table 9 shows the present status of such activities.

Table 8 - List of Nurseries Maintaining Sanitation Zones in Northeastern Region

December 31, 1953

	Acreage of Sanitation Zone
Maine	
Western Maine Nursery - Fryeburg, Maine	311
State Nursery - Orono, Maine	162
	473
New Hampshire	
Keene Forestry Associates - Keene, N. H.	250
State Nursery - Boscawen, N. H.	499
	749
Vermont	
State Nursery - Essex Junction, Vt.	333
Massachusetts	
Department of Conservation Nursery - Amherst, Mass.	225
" " " " - Bridgewater, Mass.	100
" " " " - Clinton, Mass.	150
" " " " - Erving, Mass.	50
Kelsey Highlands Nursery - Boxford, Mass.	900
Weston Nursery - Weston, Mass.	60
	1,485
Connecticut	
Northeastern Forestry Company - Cheshire, Conn.	356
State Nursery - Barkhamsted, Conn.	492
Great Pond Nursery - Simsbury, Conn.	188
	1,036

Table 3 - List of Nurseries Maintaining Sanitation Zones in Northeastern Region

December 31, 1953 (Continued)

	Acreage of Sanitation Zone
New York	
State Nursery - Saratoga Springs, N. Y. (old portion	705
(new portion	1,606
State Nursery - Lowville, N. Y.	1,150
N. Y. State College of Forestry Nursery - Syracuse, N. Y.	230
State Nursery (Division of Fish and Game) - Painted Post, N.Y.	206
Soil Conservation Service Nursery - Big Flats, N. Y.	470
	4,368
New Jersey	
State Nursery - Washington Crossing, N. J.	600
Pennsylvania	
Clearfield State Nursery - Clearfield, Pa.	370
Greenwood State Nursery - Petersburg, Pa.	411
Mt. Alto State Nursery - Mt. Alto, Pa.	366
Rockview State Nursery - Pleasant Gap, Pa.	354
Howard State Nursery - Mt. Eagle, Pa.	215
Andorra Nursery - Chester Hill, Pa.	1,065
Fairview Nursery - Fairview, Pa.	559
Doyle Nursery - Seven Stars, Pa.	581
	3,921
Maryland	
State Forest Nursery - Harmons, Md.	-
North Carolina	
N. C. State Forest Nursery - Penrose, N. C.	100
Tennessee	
TVA Nursery - Clinton, Tenn.	300
Virginia	
State Forest Nursery - Charlottesville, Va.	200
W. Virginia	
State Forest Nursery - LeSage, W. Va.	162
Parsons Nursery - Parsons, W. Va.	651
	813
All States	
34 Nurseries	14,376

Table 9 - Status of Nursery Sanitation Work, September 30, 1953

State	Nurseries Where Protection Established and Being Maintained: Number					No. Nurseries Protected During 1953	No. Additional Nurseries Which Established Zones But Now Abandoned
	Federal	State	Private	Total	Acreage of Control Areas		
Me.	-	1	1	2	473	-	5
N. H.	-	1	1	2	749	-	1
Vt.	-	1	-	1	333	-	-
Mass.	-	4	2	6	1,485	1	13
R. I.	-	-	-	-	-	-	6
Conn.	-	1	2	3	1,036	-	18
N. Y.	1	4	-	5	4,365	3	4
N. J.	-	1	-	1	600	-	1
Pa.	-	5	3	8	3,921	-	6
Del.	-	-	-	-	-	-	5
Ga.	-	-	-	-	-	-	1
Ky.	-	-	-	-	-	-	1
Md.	-	1	-	1	-	1	13
N. C.	-	1	-	1	100	-	19
Tenn.	1	-	-	1	300	-	2
Va.	-	1	-	1	200	-	9
W. Va.	-	2	-	2	813	1	-
All States	2	23	11	34	14,375	6	104

Blister Rust Canker Elimination Work During 1953

Blister rust canker elimination during the current year was restricted to state lands in 10 towns in New York where the pines had high aesthetic value. A total of 8,765 white pines was examined and 1,419 fatally diseased trees were cut down. In addition, 384 branch infections and 23 stem cankers were removed from 397 other pines. A total of 231 man days was used in canker elimination work.

The record of accumulated data from 1932-1951 inclusive was presented in Table 38 in the 1951 annual report.

Status of Control Work on State and Private Lands

As of September 30, 1953, the control area on state and private lands amounted to 15,829,766 acres of which 6,144,375 acres represent stands of white pine meeting standards warranting continued control. First working has been performed on 98.2% of the control area and second working on 47.2%. The 12,568,464 acres on maintenance amounts to 79.4% of the total and includes all of the control area in Connecticut, Rhode Island, New Jersey, Delaware, Kentucky and South Carolina. The greatest increase in percentage of total control area that is on maintenance was in New York with an increase of 10.6%, then New Hampshire with 9.9%, Maine with 7.3%, Vermont with 7.2%, and Pennsylvania with 2.8%. The changes in the Southern Appalachian states were minor, because in that area 96.1% of the aggregate control area is in the maintenance category. However, in West Virginia there was an increase of 6.4%.

Detailed mapping has been completed on 89.8% of the control area, but many of the original maps are rather obsolete because of changes resulting from hurricanes, large fires, and extensive logging. Control area mapping and remapping during 1953 resulted in further reductions in the control area and white pine acreages. The net control area dropped 234,155 acres and the net pine area was reduced by 20,443 acres.

The control program in Rhode Island was concluded in September. During the last few years no damaging concentrations of ribes have been found and the average number of ribes per acre has been less than one bush. No further work is justified although reconnaissance will be undertaken if there is evidence of a change in this satisfactory condition.

The present status of control work in each state is shown in Table 10.

Table 10 - **Status of Blister Rust Control Work on State and Private Lands**

September 30, 1953

State	Total Acreage of Net Control Area	Acreage of White Pine in Control Area	Acreage of Control Area Detail Mapped	Pre-Maintenance Acreage: Worked Once	Pre-Maintenance Acreage: Worked Twice	Pre-Maintenance Acreage: Worked Three Times	Maintenance Acreage: Now on Maintenance	Maintenance Acreage: Worked	Maintenance Acreage: No Further Work Needed
Me.	2,278,509	893,804	2,135,775	2,154,375	1,478,501	428,729	1,382,155	48,917	68,340
N.H.	2,623,808	1,220,744	1,808,574	2,595,952	1,720,459	288,303	1,493,638	50,329	8,291
Vt.	725,864	174,400	718,126	645,051	233,324	44,862	502,838	12,828	8,804
Mass.	1,463,999	594,521	1,068,720	1,461,399	1,163,218	217,389	1,340,693	1,875	797,237
R.I.	147,778	64,018	138,613	147,778	141,390	34,068	147,778	104,440	147,778
Conn.	459,504	95,448	459,504	459,504	307,584	129,643	459,504	285,205	248,079
N.Y.	2,365,846	752,693	2,133,084	2,334,513	1,893,625	1,055,955	1,750,642	488,471	3,795
N.J.	16,742	3,771	-	16,742	1,417	-	16,742	-	16,742
Pa.	486,631	104,291	484,586	483,329	313,739	75,834	418,939	60,485	44,557
Del.	6,188	242	6,186	6,186	-	-	6,186	-	6,188
Ga.	324,452	248,576	324,452	324,452	676	441	324,302	-	324,302
Ky.	114,312	31,199	114,312	114,312	-	-	114,312	-	114,282
Md.	163,994	70,625	163,994	163,994	17,166	27,595	152,434	-	54,553
N.C.	1,362,155	581,785	1,362,155	1,362,155	4,654	2,161	1,359,462	-	1,356,491
S.C.	77,008	45,398	77,008	77,008	25,935	-	77,008	-	77,008
Tenn.	1,066,781	466,280	1,066,781	1,066,781	12,794	5,236	1,059,854	-	1,042,893
Va.	1,526,650	554,228	1,526,650	1,508,701	39,686	13,337	1,449,368	8,868	-
W. Va.	621,547	242,352	621,547	620,972	117,890	22,716	512,709	1,389	-
All States	15,829,756	5,144,375	14,210,067	15,545,204	7,477,060	2,346,268	12,568,464	1,062,817	4,315,338

State	Percentage of Net Control Area: Detail Mapped	Worked Once	Worked Twice	On Maintenance
Me.	93.8	94.6	64.9	60
N.H.	68.9	98.9	65.6	[illegible]
Vt.	98.9	88.9	32.1	[illegible]
Mass.	73.0	99.8	[illegible]	91.[illegible]
R.I.	93.8	100.0	95.7	100.0
Conn.	100.0	100.0	66.[illegible]	100.0
N.Y.	90.[illegible]	98.[illegible]	80.[illegible]	74.[illegible]
N.J.	-	100.0	8.5	100.0
Pa.	99.6	99.3	64.[illegible]	86.[illegible]
Del.	100.0	100.0		100.0
Ga.	100.0	100.0	0.2	99.9
Ky.	100.0	100.0		100.0
Md.	100.0	100.0	10.5	93.0
N.C.	100.0	100.0	0.3	99.8
S.C.	100.0	100.0	33.7	100.0
Tenn.	100.0	100.0	1.2	99.4
Va.	100.0	98.8	2.6	94.9
W. Va.	100.0	99.9	19.0	82.5
All States	89.8	98.3	45.[illegible]	79.4

In connection with control needs, the figure of 1,619,693 acres needing initial mapping emphasizes the fact that mapping is an important element in the work load of the project especially in view of the circumstance that remapping will be needed on that portion of the area on maintenance where ribes regenerate. As previously pointed out, the figure representing acreage in need of initial mapping is somewhat excessive, in that it includes substantial acreage in some states already on maintenance.

The acreage requiring first work has been reduced each year and considerably so in 1953 in Massachusetts, Vermont and New York. However, with new acreages of reproduction reported in remapping activities, the figure of 286,562 acres is still sizeable. The largest acreages needing first work are in Maine where they represent 5.4% of the control area in the State.

The major work load is represented by the 2,974,740 acres requiring rework, and the need for the examination of the extensive acreages in the maintenance classification in accordance with the ten-year examination interval policy. During 1953 excellent progress was made when the item of rework was reduced by nearly 900,000 acres from the net figure in 1952. In addition it was determined that 4,315,338 acres in the maintenance category will require no further work because of non-ribes site conditions. Moreover, experience has shown that while the balance of the area on maintenance will have to be examined, only about 15% of the area examined will require further work.

Data on control work needed are included in Table 11.

Table 11 - Control Work Needed on State and Private Lands
(As of September 30, 1953)

State	Total Acreage of Net Control Area	Acreage in Net Control Area in Need of			% Net Control Area in Need of		
		Initial Detail Mapping	Pre-Maintenance Work		Initial Detail Mapping	Pre-Maintenance Work	
			First Work	Rework		First Work	Rework
Me.	2,276,509	140,734	122,134	772,220	6.2	5.4	33.9
N. H.	2,623,808	815,234	27,856	1,102,314	31.1	1.1	42.0
Vt.	725,864	7,738	80,813	142,213	1.1	11.1	19.6
Mass.	1,463,999	395,279	2,600	120,706	27.0	0.2	8.2
R. I.	147,778	9,165	-	-	6.2	-	-
Conn.	459,504	-	-	-	-	-	-
N. Y.	2,365,846	232,762	1,333	583,871	8.7	0.1	25.0
N. J.	16,742	16,742	-	-	100.0	-	-
Pa.	486,631	2,045	3,302	64,390	0.4	0.7	13.2
Del.	6,185	-	-	-	-	-	-
Ga.	324,452	-	-	150	-	-	-
Ky.	114,312	-	-	-	-	-	-
Md.	163,994	-	-	11,560	-	-	7.0
N. C.	1,362,155	-	-	2,693	-	-	0.2
S. C.	77,008	-	-	-	-	-	-
Tenn.	1,066,751	-	-	6,927	-	-	-
Va.	1,626,000	-	17,949	59,433	-	1.2	3.9
W. Va.	621,547	-	575	108,263	-	0.1	17.4
11 States	15,829,766	1,619,693	286,562	2,974,740	10.1	1.6	18.8

BLISTER RUST CONTROL WORK ON NATIONAL FORESTS

There are three National Forests in the Northeastern States, namely White Mountain in New Hampshire and Maine, Green Mountain in Vermont, and Allegheny in Pennsylvania. In the Southern Appalachian Area, there are the George Washington in Virginia and West Virginia, the Jefferson in Virginia, Monongahela in West Virginia, Cumberland in Kentucky, Pisgah and Nantahala in North Carolina, Cherokee in Tennessee, Sumter in South Carolina and Chattahoochee in Georgia.

The three National Forests in the Northeastern States contain only 3,500 acres of white pine, 2,000 acres of which is located on the White Mountain National Forest, about equally distributed in Maine and New Hampshire. The largest area of pine on this Forest in New Hampshire is located in the Swift River Valley where a partial cutting was made several years ago. The remainder of the pine on this Forest in New Hampshire consists of scattered units.

The pine on the Green Mountain National Forest consists of plantations and natural reproduction under 6" D.B.H. The Forest Service is planning to manage this pine as a crop, making thinnings and selective cuttings as needed in the future.

Several of the pine stands on the Allegheny National Forest are being reserved for camp sites, picnic areas, or as examples of mature growth. A few of the mature stands have been cut in recent years. The amount of pine reproduction on the Forest is very limited.

There are 134,839 acres of white pine within the boundaries of the Pisgah and Nantahala National Forests in North Carolina.

In Tennessee, there are 250,092 acres of pine on the Cherokee National Forest. The quality of Tennessee white pine is excellent, and its growth is above average. Where there has been adequate protection from fire and grazing, reproduction is rapidly expanding the pine acreage.

White pine is abundant in the National Forests of Virginia, with 161,000 acres on the George Washington and 55,000 acres on the Jefferson. The species is held in high esteem on these Forests. The technically trained foresters know its value and are making every effort to favor it, both by expanding the areas and increasing the stocking. These foresters are alert to the part blister rust control must play in management. The value of the white pine on National Forest lands in the State has an estimated value of approximately $10 million.

In West Virginia, white pine is found on 50,000 acres on the George Washington and there are 46,854 acres on the Monongahela. Management plans on these Forests favor white pine on many areas, and proper consideration of the blister rust control problem is being given in development plans. The value of the white pine on the National Forests in West Virginia is estimated at $3½ million.

<u>Surveys</u> (Control Area Examination)

No surveys were required on the National Forests in the Northeastern States.

In the Southern Appalachian Area, 2,608 acres were examined on the Pisgah in North Carolina to determine future needs.

A survey of 2,155 acres was made on the Cherokee National Forest in Tennessee on sites where white pines are to be planted.

In Virginia, 36,860 acres were examined on the George Washington to determine whether additional areas should be managed as white pine units and protected as such. On the Jefferson National Forest, 59,569 acres were examined, mostly on original block-out areas.

Control area examination on 3,188 acres on the George Washington National Forest in West Virginia, was conducted in reappraisal of the white pine for protection purposes.

Surveys (Mapping)

No mapping was required on the National Forests in the Northeastern States.

In the Southern Appalachian Area, 640 acres were remapped on the Cherokee in Tennessee for the purpose of including white pine that previously did not meet minimum standards.

In Virginia, some remapping was undertaken to record changes in white pine acreages.

On the Monongahela National Forest in West Virginia, 1,500 acres were mapped initially on an area to be converted to a white pine management unit.

1953 Accomplishments in Ribes Eradication

Control work was performed on 40 acres on the White Mountain in Maine; on 22 acres on the Green Mountain in Vermont; and on 755 acres on the Allegheny National Forest in Pennsylvania in the Northeastern States.

In the Southern Appalachian Area, a few cultivated ribes were destroyed in connection with the examination of planting sites on the Cherokee National Forest in Tennessee. In Virginia, crews were employed in eradication work on 22,019 acres on National Forest lands, 18,357 acres on the George Washington and 3,662 acres on the Jefferson. Ribes were removed from 2,955 acres within the George Washington National Forest in West Virginia, and a small area of 103 acres on the Monogahela. The latter work was in a protection zone on a "Green Thumb" planting project.

In the region, an aggregate area of 25,894 acres was covered and 203,767 ribes destroyed thru the use of 4,126 man days of labor. The production rate was 6.3 acres per man day. Details of work by Forests are shown in Table 12.

Status of Control

Excellent progress has been made in the control program on the National Forests in the region with three Forests (Green Mountain in Vermont, Cumberland

in Kentucky, and Sumter in South Carolina), 100% on maintenance. On all other Forests except the White Mountain in Maine and New Hampshire, and the George Washington in Virginia and West Virginia, the control areas are more than 90% on maintenance. On the White Mountain, 89.1% is in the maintenance category, and 86.6% on the George Washington.

Details relating to the status of control on the National Forests are shown in Table 13, and control work needed in Table 14.

Table 12 - Ribes Eradication Work on National Forests During [illegible]

National Forests	First Working			Second Working			Other Pre-Maintenance Working			Maintenance Workings			All Workings		
	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days
White Mt.-N.H.	40	740	3	-	-	-	-	-	-	-	-	-	40	740	3
Green Mt.-Vt.	22	133	1	-	-	-	-	-	-	-	134	5	22	267	6
Allegheny-Pa.	-	-	-	395	5,580	28	290	5,605	25	70	560	5	755	9,745	58
Cherokee-Tenn.	-	44	1	-	-	-	-	-	-	-	-	-	-	44	1
Geo. Washington Va.	2,624	30,121	540	3,789	18,477	640	7,640	38,645	1,449	4,304	10,190	445	18,357	97,433	[illegible]
Geo. Washington W. Va.	286	16,307	61	290	1,967	40	2,185	13,922	279	194	2,226	22	2,955	34,422	[illegible]
Jefferson-Va.	70	5,747	24	777	9,504	164	1,262	26,881	193	1,553	14,614	271	3,662	59,746	[illegible]
Monongahela-W. Va.	-	-	-	-	-	-	73	1,342	17	30	28	4	103	1,370	21
Total	3,042	56,092	630	5,251	35,528	772	11,450	86,395	1,972	6,151	27,752	752	25,894	205,767	4,126

National Forests	Acres per Man Day	Per Acre Values	
		Man Days	Ribes
White Mt.-N.H.	13.3	.075	18.5
Green Mt.-Vt.	3.7	.273	12.1
Allegheny-Pa.	11.1	.900	12.9
Cherokee-Tenn.	-	-	-
Geo.Washington-Va.	6.2	.162	5.3
Geo.Washington-W.Va.	7.4	.138	11.6
Jefferson-Va.	5.6	.178	16.3
Monongahela-W.Va.	4.9	.204	13.3
Total	6.3	.159	7.9

Table 14 - Status of Ribes Eradication on National Forests

September 30, 1953

National Forest	Total Acreage of Net Control Area	Acreage of White Pine in Control Area	Acreage of Control Area Detail Mapped	Pre-Maintenance Acreage: Worked Once	Pre-Maintenance Acreage: Worked Twice	Pre-Maintenance Acreage: Worked Three Times	Maintenance Acreage: Now in Maintenance	Maintenance Acreage: Worked	Maintenance Acreage: No Further Work Needed
White Mt. Me. & N.H.	5,379	2,000	5,379	5,379	5,136	2,974	4,797	1,270	
Green Mt. Vt.	2,308	544	2,308	2,308	115	0	2,308		
Allegheny Pa.	4,085	357	4,085	4,085	3,530	1,496	3,970	241	
Geo. Washington Va. & W. Va.	424,973	191,267	424,973	419,491	86,337	58,965	365,139	4,221	
Jefferson Va.	107,514	55,084	107,514	107,514	4,571	2,147	102,906	1,254	
Monongahela W. Va.	89,559	46,854	89,559	89,559	11,606	7,415	84,178	465	
Cumberland, Ky.	32,002	16,980	32,002	32,002	65	65	32,002		31,937
Pisgah, N.C.	161,752	92,701	161,752	161,752	2,828	1,856	159,470		[illegible]
Nantahala, N.C.	62,709	42,138	62,709	62,709	7	-	62,695	-	62,702
Cherokee, Tenn.	484,948	250,092	484,948	484,948	2,103	41	482,516	-	[illegible]
Sumter, S.C.	53,862	18,794	53,862	53,862	3,700	-	53,862	-	53,862
Chattahoochee, Ga.	349,903	295,902	349,903	349,903	330	97	349,715	-	[illegible]
Region Total	1,778,994	1,018,313	1,778,994	1,773,512	120,228	74,824	1,705,753	7,346	[illegible]

National Forest	Percentage of Net Control Area: Detail Mapped	Worked Once	Worked Twice	On Maintenance
White Mountain	100.0	100.0	95.5	89.1
Green Mountain	100.0	100.0	5.0	100.0
Allegheny	100.0	100.0	86.4	97.1
George Washington	100.0	98.7	20.3	86.6
Jefferson	100.0	100.0	4.3	95.7
Monongahela	100.0	100.0	13.0	94.0
Cumberland	100.0	100.0	0.2	100.0
Pisgah	100.0	100.0	1.7	98.7
Nantahala	100.0	100.0	-	99.9
Cherokee	100.0	100.0	0.4	99.5
Sumter	100.0	100.0	6.9	100.0
Chattahoochee	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 14 - Control Work Needed on National Forests
(as of September 30, 1953)

National Forest	Total Acreage of Net Control Area	Acreage in Net Control Area in need of			Percentage of Net Control Area in need of		
		Detail Mapping or Survey	Pre-Maintenance Work		Detail Mapping or Survey	Pre-Maintenance Work	
			First Work	Rework		First Work	Rework
White Mountain, Me. & N.H.	5,379	-	-	582	-	-	10.8
Green Mountain, Vt.	2,308	-	-	-	-	-	-
Allegheny, Pa.	4,085	-	-	115	-	-	2.8
Geo. Washington, Va. & W.Va.	424,973	-	5,482	51,352		1.3	12.1
Jefferson, Va.	107,514	-	-	4,603	-	-	4.3
Monongahela, W.Va.	89,559	-	-	5,385	-	-	6.0
Cumberland, Ky.	32,002	-	-	-	-	-	-
Pisgah, N.C.	161,752	-	-	3,082		-	1.9
Nantahala, N.C.	62,709	-	-	14	-	-	-
Cherokee, Tenn.	484,948	-	-	2,432	-	-	0.5
Sumter, S.C.	53,862	-	-	-	-	-	-
Chattahoochee, Ga.	349,903		-	190	-	-	0.1
Region Total	1,728,994	-	5,482	67,759	-	0.3	3.8

BLISTER RUST CONTROL ON NATIONAL PARKS

Cooperation with the Department of the Interior involves work on the Acadia National Park in Maine, the Saratoga Battlefield Historical National Park in New York, the Shenandoah National Park in Virginia, the Blue Ridge Parkway in North Carolina and Virginia, and the Great Smoky National Park in North Carolina and Tennessee.

About 50% of the control area on the Acadia National Park in Maine was devastated by fire in October 1947. The future of the white pine in this burned portion is not promising. Pending a survey of conditions to determine the persistence or regeneration of white pine and ribes, control area data will not be changed. Prior to the fire, the Park supported 3,200 acres of white pine.

On the Saratoga Battlefield Historical National Park in New York, there are only 166 acres of white pine. The control problem has been complicated by the banning of the use of chemicals on the concentrations of *Ribes americanum*.

The Great Smoky Mountain National Park in North Carolina has 12,106 acres of white pine and the Blue Ridge Parkway in the same State includes 5,627 acres. The former contains many excellent stands of high quality pine in some sections.

In Tennessee, there are about 56,000 acres of white pine within the boundary of the Great Smoky Mountains National Park.

In Virginia, the Shenandoah National Park contains 3,080 acres of pine, and there are 415 acres on the Blue Ridge Parkway. On these Parks, white pine has a high aesthetic value. The loss of the species from some of the areas as a result of blister rust would be great, particularly at some of the camp sites, overlooks, and along the scenic Drive. At the time the Blue Ridge Parkway was established, the white pine was chosen as the official emblem, because it is common to practically all the country the Parkway traverses.

Surveys (Control Area Examination)

No control area examination was performed on the National Parks in the Northeastern States.

In the Southern Appalachian Area, 784 acres were examined on the Great Smoky Mountains National Park in North Carolina on sections adjacent to ribes-bearing areas scheduled for eradication work.

In Virginia, a survey was conducted on 2,257 acres to determine the come-back of ribes on certain areas. No control area examination was needed on the Blue Ridge Parkway.

Surveys (Mapping)

No mapping or remapping was performed on the National Parks in the Northeastern States.

In the Southern Appalachian Area, 892 acres were mapped on the Blue Ridge Parkway in North Carolina for the purpose of establishing control on an area of high aesthetic value.

No mapping was performed in Virginia, altho the Blue Ridge Parkway program was reviewed and adjustments made in white pine acreage and control area.

1953 Accomplishments in Ribes Eradication

In the Northeastern States, the only ribes eradication work performed was that on 953 acres on the Saratoga Battlefield Historical Park.

On the Great Smoky Mountains National Park in North Carolina, 351 acres were cleared of ribes in a section where there are excellent stands of high quality white pine.

In Virginia, 110 acres were covered on the Shenandoah National Park and 160 acres on the Blue Ridge Parkway.

In the Region, an aggregate area of 1,574 acres was worked and 15,780 ribes destroyed thru the use of 183 man days of labor. The production rate was 8.6 acres per man day. Details of work on the National Parks are shown in Table 15.

Status of Control

The control program on the National Parks in the Region is well in hand with Acadia National Park in Maine, and the Shenandoah in Virginia, 100% on maintenance; the Blue Ridge Parkway, 88.6% and the Great Smoky Mountains, 94.5%.

As of September 30, 1953, there were 156,714 acres in the net control area in the National Parks of which 80,393 acres are white pine. All first work has been completed. Second work had been performed on 12.6% and 94.5% is on maintenance.

There will be need for rework on 8,613 acres which represents only 5.5% of the net control area.

Details regarding status of control by Parks are shown in Table 16 and control work needed in Table 17.

Table 15 - Ribes Eradication Work on National Parks During 1953

National Parks	First Working			Second Working			Other Pre-maintenance Workings			All Workings			Acres Per Man Day	Per Acre Values	
	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days	Acres	Ribes	Man Days		Man Days	Ribes
Saratoga Btlfld. N.Y.	-	-	-	-	-	-	953	11,601	29	953	11,601	29	32.9	.030	12.2
Great Smoky No. Car.	50	500	4	44	100	2	257	2,309	91	351	2,909	97	3.6	.276	[illegible]
Blue Ridge Pkwy. Va.	-	-	-	-	-	-	160	814	33	160	814	33	4.8	.206	[illegible]
Shenandoah, Va.	-	-	-	-	-	-	110	456	24	110	456	24	4.6	.218	4.1
Total	50	500	4	44	100	2	1,480	15,180	177	1,574	15,760	183	[illegible]	.116	[illegible]

Table 16 – Status of Ribes Eradication Work on National Parks

September 30, 195[illegible]

National Park	Total Acreage of Net Control Area	Acreage of White Pine in Control Area	Acreage of Control Area Detail Mapped	Pre-Maintenance Acreage: Worked Once	Pre-Maintenance Acreage: Worked Twice	Pre-Maintenance Acreage: Worked Three Times	Maintenance Acreage: Now on Maintenance	Maintenance Acreage: Worked	Maintenance Acreage: No Further Work Needed
Acadia Me.	16,872	3,200	-	16,872	11,271	4,979	16,872	3,228	-
Saratoga Battle Field N.Y.	955	166	955	955	955	955	-	-	-
Shenandoah Va.	14,270	3,080	14,270	14,270	5,012	4,433	14,270	-	-
Blue Ridge Pkwy. N.C. & Va.	13,663	6,042	13,663	13,663	2,087	276	12,104	-	11,761
Great Smoky N.C. & Tenn.	110,954	67,905	110,954	110,954	457	617	104,855	-	83,497
Region	156,714	80,393	139,842	156,714	19,782	11,260	148,101	3,228	95,258

National Park	Percentage of Net Control Area: Detail Mapped	Worked Once	Worked Twice	On Maintenance
Acadia	-	100.0	66.8	100.0
Saratoga Battlefield	100.0	100.0	100.0	-
Shenandoah	100.0	100.0	35.1	100.0
Blue Ridge Parkway	100.0	100.0	15.3	88.6
Great Smoky	100.0	100.0	0.4	94.5
Region	89.2	100.0	12.6	94.5

Table 17 - Control Work Needed on National Parks
(As of September 30, 1953)

National Park	Total Acreage of net Control Area	Acreage in Net Control Area in Need of			Percentage of Net Control Area in Need of		
		Detail Mapping or Survey	Pre-Maintenance Work		Detail Mapping or Survey	Pre-Maintenance	
			First Work	Rework		First Work	Rework
Acadia	16,872	16,872	-	-	100.0	-	-
Saratoga Battlefield	955	-	-	955	-	-	100.0
Shenandoah	14,270	-	-	-	-	-	-
Blue Ridge Pkwy.	13,663	-	-	[illegible]	-	-	11.4
Great Smoky	110,954	-	-	6,099	-	-	5.5
Region	156,714	16,872	-	8,813	10.8	-	[illegible]

BLISTER RUST CONTROL WORK ON INDIAN LANDS

The only control program on Indian Lands in the Region is on the Cherokee Indian Reservation in North Carolina.

All work has been completed on a control area of only 445 acres of which 22 acres are white pine. The entire area is on maintenance and conditions are such that no further control work is anticipated.

MISCELLANEOUS ITEMS

Wage Rates

Wage rates for federal workers during the 1953 field season were promulgated by the Regional Wage Board effective on April 26 as follows:

	Class of Work		Rate per Hour
MAINE AND VERMONT	Laborer I		$1.05
	Laborer III	(Crew Leader)	1.20
	Foreman I	(Scout or Foreman-Scout)	1.35
	Foreman II	(Foreman)	1.45
NEW HAMPSHIRE	Laborer I		1.10
	Laborer III	(Crew Leader)	1.30
	Foreman I	(Scout or Foreman-Scout)	1.45
	Foreman II	(Foreman)	1.55
MASSACHUSETTS	Laborer I		1.20
	Laborer III		1.35
	Foreman I		1.50
	Foreman II		1.60
NEW YORK and PENNSYLVANIA	Laborer I		1.10
	Laborer II		1.20
	Laborer III	(Crew Leader)	1.25
	Foreman I	(Scout or Foreman-Scout)	1.35
	Foreman II	(Foreman)	1.45
NEW JERSEY	Laborer I		1.45
VIRGINIA and W. VIRGINIA	Laborer I		1.00
	Laborer II		1.10
	Laborer III	(Crew Leader)	1.15
	Foreman I	(Scout or Foreman-Scout)	1.25
	Foreman II	(Foreman)	1.35
GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, AND TENNESSEE	Laborer III	(Crew Leader)	1.15
	Foreman I		1.25

Temporary Personnel Employed on Control Work

The maximum number of workers employed by all agencies during the 1953 field season was 518 as compared with 698 in 1952.

Injuries to Temporary Federal L/A Employees

The excellent safety record maintained on the project was demonstrated again by the fact that only four men sustained injuries during the year and none

not of a serious nature. There were two instances [illegible], two cases of knee strain and one injury involving a wrenched hip.

Automotive Equipment

Considerable improvement in project automotive equipment occurred during 1953. Six old trucks and four passenger cars were sold and 1 surplus truck was released to the Augusta County (Va.) School officials. Two new trucks were purchased and an order placed for a passenger car. One station wagon was obtained by transfer from the Japanese Beetle and Moth Certification Project. The 1946 Ford sedan received from the Forest Service in 1952 was returned to that agency March 3, 1953. Four trucks were also transferred from our project in the Southern Appalachian Area for use in the Northeastern States.

At the end of 1953, federally-owned automotive equipment in this region included 78 trucks and 33 passenger-carrying vehicles. One of these trucks and 2 passenger cars have been declared surplus.

		Trucks					Passenger Cars		
Year of Manu- facture	½ Ton Pick-Ups	Sedan Deli- veries	Suburban Carry-All	Panels	1½ Ton	Jeep	Coupes	Sedans	Sta. Wagons
1939	1**	-	-	-	-	-	-	-	-
1940	-	-	-	-	-	-	1**	-	-
1942	-	-	-	-	3	-	3*	-	-
1947	33	4	-	14	-	-	[illegible]	5	-
1948	1	-	-	1	-	[illegible]	[illegible]	1	1
1949	6	-	-	-	-	-	[illegible]	14	-
1950	-	3	2	-	-	-	-	4	-
1951	2	-	-	-	-	-	-	[illegible]	-
1952	3	2	-	-	-	-	-	-	-
1953	-	2	-	-	-	-	-	-	-
Total	46	11	2	15	3	1	6	[illegible]	1

*One of these declared surplus.
**Declared surplus.

State Compensation for Cultivated Ribes During 1953

No compensation was paid by the states to reimburse any of the owners of the cultivated ribes destroyed in connection with 1953 control activities. A record of compensation paid by the states from 1918 to 1950 will be found in Table 39 of the 1951 annual report.

APPENDIX.

Table 18 - Maintenance Work During 1953 - Northeastern Region

State	Ownership	Total Acreage Examined	Acreage Worked	Number Ribes Destroyed	Total Man Days	Acres Worked Per Man Day	Per Acre Values: Man Days	Per Acre Values: Ribes
Maine	State & Private	31,205	651	23,411	135	4.8	.207	36.0
N.H.	" " "	63,174	3,379	37,478	259	13.0	.077	11.1
Vt.	" " "	7,073	924	10,513	65	14.2	.070	11.4
	Forest Service	573	-	134	5	-	-	-
Mass.	State & Private	36,906	433	3,399	14	30.9	.032	7.8
R. I.	" " "	21,340	-	194	-	-	-	-
Conn.	" " "	56,600	303	17,962	24	12.6	.079	59.3
N. Y.	" " "	47,259	19,393	72,805	750	25.9	.039	3.7
Pa.	" " "	8,490	8,455	46,160	650	13.0	.077	5.5
	Forest Service	70	70	560	5	14.0	.071	8.0
Va.	State & Private	59,825	7,628	59,444	1,094	7.0	.143	7.8
	Forest Service	22,430	5,657	24,804	716	8.2	.122	4.2
	Park Service	2,147	-	-	-	-	-	-
W.Va.	State & Private	1,565	975	3,054	85	11.5	.087	3.1
	Forest Service	614	224	2,264	26	8.5	.116	10.1
All States	State & Private	333,438	42,141	273,227	3,078	13.7	.073	6.5
	Forest Service	23,687	6,151	27,762	752	8.2	.122	4.5
	Park Service	2,147	-	-	-	-	-	-
	Total	359,272	48,292	300,979	3,828	12.6	.079	6.2

Table 19 - Ribes Eradication Work on Maintenance Areas, 1946-1955, Inclusive

(No separate record kept of such work prior to 1946)

State	Land Ownership Class	Acreage Worked	No. Ribes Destroyed	Total Man Days	Acres Worked Per Man Day	Per Acre Values: Man Days	Per Acre Values: Ribes
Maine	State & Private	33,864	71,486	839	40.4	.025	2.1
	National Park	8,829	1,162	247	35.7	.028	.1
	Total	42,693	72,648	1,086	39.3	.025	1.7
N. H.	State & Private	41,496	111,574	1,064	39.0	.026	2.7
	Forest Service	1,070	1,063	18	59.4	.017	1.0
	Total	42,566	112,637	1,082	39.3	.025	2.6
Vt.	State & Private	7,969	35,748	289	27.6	.036	4.5
	Forest Service	-	134	5	-	-	-
Mass.	State & Private	2,294	7,474	79	29.0	.034	3.3
R. I.	" " "	87,035	13,847	1,500	58.0	.017	0.2
Conn.	" " "	332,853	430,005	5,407	61.6	.016	1.3
N. Y.	" " "	348,697	586,685	10,046	34.7	.029	1.7
Pa.	" " "	66,041	100,216	2,091	31.6	.032	1.5
	Forest Service	240	675	17	14.1	.071	2.8
	Total	66,281	100,891	2,108	31.4	.032	1.5
Va.	State & Private	8,313	74,442	1,271	6.5	.152	8.9
	Forest Service	5,857	24,804	716	8.2	.122	4.2
	Total	14,170	99,246	1,987	7.1	.140	7.0
W. Va.	State & Private	1,358	3,258	110	12.3	.081	2.4
	Forest Service	674	2,531	78	8.6	.116	3.8
	Total	2,032	5,789	188	10.8	.093	2.8
All States	State & Private	929,920	1,434,735	22,696	41.0	.024	1.5
	Forest Service	7,841	29,207	834	9.4	.106	3.7
	Park Service	8,829	1,162	247	35.7	.028	.1
	Total	946,590	1,465,104	23,777	39.8	.025	1.5

Table 20 - STATUS OF BLISTER RUST CONTROL WORK IN PRESENT NET CONTROL AREA IN NORTHEASTERN REGION BY STATES AND DISTRICTS

(September 30, 1953)

State	District	Total Control Area	Acreage of White Pine	Acreage Detail Mapped	Net Acreage Worked: Pre-Maintenance Work: First	Net Acreage Worked: Pre-Maintenance Work: Second	Net Acreage Worked: Pre-Maintenance Work: Other	Net Acreage Worked: Maintenance Work	Acreage in Control Area: Now on Maintenance	Acreage in Control Area: In Need of Pre-Maintenance Work: First Work	Acreage in Control Area: In Need of Pre-Maintenance Work: Rework	Percentage of Control Area: Detail Mapped	Percentage: Worked: Pre-Maintenance: First	Percentage: Worked: Pre-Maintenance: Second	Percentage: Worked: Pre-Maintenance: Other	Percentage: Worked: Maintenance	Percentage: On Maintenance	Percentage: In Need of Pre-Maintenance Work: First Work	Percentage: In Need of Pre-Maintenance Work: Rework
Maine	Bradbury	734,312	219,989	699,297	643,858	351,439	73,885	34,030	402,350	90,454	241,508	95.2	87.7	47.9	10.1	4.6	54.8	12.3	32.9
	Calderara	781,835	307,529	738,128	750,155	513,296	148,696	2,484	386,491	31,680	363,664	94.4	95.9	65.7	19.0	.3	49.4	4.1	46.5
	Pike	779,539	370,486	700,655	779,539	627,189	211,323	15,631	611,989	-	167,550	89.9	100.0	80.5	27.1	2.0	78.5	-	21.5
	Totals for State	2,295,686	898,004	2,138,080	2,173,552	1,491,924	433,904	52,145	1,400,830	122,134	772,722	93.1	94.7	65.0	18.9	2.3	61.0	5.3	33.7
N. H.	Boomer	394,826	163,001	394,826	390,217	238,953	17,842	5,629	177,663	4,609	212,554	100.0	98.8	60.5	4.5	1.4	45.0	1.2	53.8
	Codman	267,092	133,453	228,951	267,092	234,793	69,072	17,433	231,186	-	35,906	85.7	100.0	87.9	25.9	6.5	86.6	-	13.4
	Conner	711,920	349,552	379,543	709,473	575,310	128,867	17,328	525,355	2,447	184,118	53.3	99.7	80.8	18.1	2.4	73.8	.3	25.9
	Curtis	611,798	292,165	292,884	609,635	288,436	19,317	6,771	268,596	2,163	341,039	47.9	99.6	47.1	3.2	1.1	43.9	.4	55.7
	Newman	193,088	105,750	146,094	193,088	145,500	38,718	102	96,725	-	96,363	75.7	100.0	75.4	20.1	.1	50.1	-	49.9
	Richardson	448,158	177,823	369,350	429,521	240,451	17,165	4,136	197,107	18,637	232,414	82.4	95.8	53.7	3.8	.9	44.0	4.2	51.8
	Totals for State	2,626,882	1,221,744	1,811,648	2,599,026	1,723,443	290,981	51,399	1,496,632	27,856	1,102,394	69.0	98.9	65.6	11.1	2.0	57.0	1.1	41.9
Vt.	Mulholland	208,883	44,353	208,823	162,330	54,372	9,312	61	73,028	46,553	89,302	99.9	77.7	26.0	4.5	.1	35.0	22.3	42.7
	Palmer	182,042	47,121	181,052	161,681	53,010	5,605	9,567	131,946	20,361	29,735	99.5	88.8	29.1	3.1	5.3	72.5	11.2	16.3
	Rose	337,247	83,470	330,559	323,348	126,057	29,945	3,200	300,172	13,899	23,176	98.0	95.9	37.4	8.9	.9	89.0	4.1	6.9
	Totals for State	728,172	174,944	720,434	647,359	233,439	44,862	12,828	505,146	80,813	142,213	98.9	88.9	32.1	6.2	1.8	69.4	11.1	19.5
Mass.	Brookway	498,723	237,776	498,723	496,395	371,619	39,061	92	433,488	2,328	62,907	100.0	99.5	74.5	7.8	.1	86.9	.5	12.6
	Doore	365,181	134,423	308,554	365,165	327,666	156,136	1,783	307,981	16	57,184	84.5	99.9	89.7	42.8	.5	84.3	.1	15.6
	Eastern Mass.	600,095	222,322	261,443	599,839	463,933	22,192	-	599,224	256	615	43.6	99.9	77.3	3.7	-	99.8	.1	.1
	Totals for State	1,463,999	594,521	1,068,720	1,461,399	1,163,218	217,389	1,875	1,340,693	2,600	120,706	73.0	99.8	79.5	14.8	.1	91.6	.2	8.2
R. I.	Schreier	147,778	64,018	138,613	147,778	141,390	34,068	104,440	147,778	-	-	93.8	100.0	95.7	23.1	70.7	100.0	-	-
Conn.	Miller	267,113	43,945	267,113	267,113	157,601	56,832	149,034	267,113	-	-	100.0	100.0	59.0	21.3	55.8	100.0	-	-
	Schreier	192,391	51,503	192,391	192,391	149,983	72,811	136,171	192,391	-	-	100.0	100.0	78.0	37.8	70.8	100.0	-	-
	Totals for State	459,504	95,448	459,504	459,504	307,584	129,643	285,205	459,504	-	-	100.0	100.0	66.9	28.2	62.1	100.0	-	-
N. Y.	Barber	459,287	127,362	458,867	445,106	379,952	244,200	103,822	307,719	14,181	137,387	99.9	96.9	82.7	53.2	22.6	67.0	3.1	29.9
	Charlton	187,670	50,891	187,570	187,555	161,940	87,100	15,009	159,710	115	27,845	99.9	99.9	86.3	46.4	8.0	85.1	.1	14.8
	Harpp	625,323	290,913	607,047	625,323	593,698	422,594	296,525	566,692	-	58,631	97.1	100.0	94.9	67.6	47.4	90.6	-	9.4
	Hick	218,715	45,263	217,305	214,945	162,979	73,684	23,160	140,212	3,770	74,733	99.4	98.3	74.5	33.7	10.6	64.1	1.7	34.2
	Holcomb	228,065	72,655	210,000	226,360	186,290	128,425	22,640	165,210	1,705	61,150	92.1	99.3	81.7	56.3	9.9	72.4	.7	26.9
	Sievers	255,403	64,476	252,948	254,288	181,409	34,629	5,210	210,253	1,115	44,035	99.0	99.6	71.0	13.6	2.0	82.3	.4	17.3
	Woolschlager	240,261	74,586	186,227	239,671	160,386	61,359	10,593	132,527	590	107,144	77.5	99.8	66.8	25.5	4.4	55.2	.2	44.6
	Western N. Y.	152,077	26,713	14,075	142,220	67,926	4,919	11,512	68,319	9,857	73,901	9.3	93.5	44.7	3.2	7.6	44.9	6.5	48.6
	Totals for State	2,366,801	752,859	2,134,039	2,335,468	1,894,580	1,056,910	488,471	1,750,642	31,333	584,826	90.2	98.7	80.0	44.7	20.6	74.0	1.3	24.7
N. J.	Totals for State	16,742	3,771	-	16,742	1,417	-	-	16,742	-	-	-	100.0	8.5	-	-	100.0	-	-
Pa.	DeBerti	164,905	30,339	163,600	162,917	93,497	13,897	14,090	144,463	1,988	18,454	99.2	98.8	56.7	8.4	8.5	87.6	1.2	11.2
	Fatzinger	136,912	37,516	136,172	135,899	106,051	40,134	13,067	116,551	1,013	19,348	99.5	99.3	77.5	29.3	9.5	85.1	.7	14.2
	Lilley	188,899	37,393	188,899	188,598	117,721	23,298	33,568	161,895	301	26,703	100.0	99.8	62.3	12.3	17.8	85.7	.2	14.1
	Totals for State	490,716	105,248	488,671	487,414	317,269	77,329	60,725	422,909	3,302	64,505	99.6	99.3	64.7	15.8	12.4	86.2	.7	13.1
Sub-Total	N. E. States	10,596,280	3,910,557	8,959,709	10,328,242	7,274,264	2,285,086	1,057,088	7,540,876	268,038	2,787,366	84.6	97.5	68.6	21.6	10.0	71.2	2.5	26.3
Del.	George	6,186	242	6,186	6,186	-	-	-	6,186	-	-	100.0	100.0	-	-	-	100.0	-	-
Md.	George	163,994	70,625	163,994	163,994	17,166	27,595	-	152,434	-	11,560	100.0	100.0	10.5	16.8	-	93.0	-	7.0
Georgia	Stegall	674,355	544,478	674,355	674,355	1,008	538	-	674,015	-	340	100.0	100.0	.1	.1	-	99.9	-	.1
N. Car.	Stegall	1,626,401	734,379	1,626,401	1,626,401	9,177	4,624	-	1,614,391	-	12,010	100.0	100.0	.6	.3	-	99.3	-	.7
S. Car.	Stegall	130,870	64,192	130,870	130,870	29,635	-	-	130,870	-	-	100.0	100.0	22.6	-	-	100.0	-	-
Tenn.	Stegall	1,635,226	772,171	1,635,226	1,635,226	14,897	5,277	-	1,625,867	-	9,359	100.0	100.0	.9	.3	-	99.4	-	.6
Ky.	Keaton	146,314	48,179	146,314	146,314	65	65	-	146,314	-	-	100.0	100.0	.1	.1	-	100.0	-	-
W. Va.	Keaton	764,135	319,985	764,135	763,560	139,540	39,131	2,032	645,152	575	118,408	100.0	99.9	19.3	5.1	.3	84.4	.1	15.5
Va.	Cramer	2,022,158	773,295	2,022,158	1,998,727	126,418	70,036	14,170	1,886,658	23,431	112,069	100.0	98.8	6.3	3.5	.7	93.3	1.2	5.5
Sub-Total	So. Appalachian	7,169,639	3,327,546	7,169,639	7,145,633	337,906	147,266	16,202	6,881,887	24,006	263,746	100.0	99.7	4.7	2.1	.2	96.0	.3	3.7
GRAND TOTAL	N. E. REGION	17,765,919	7,238,103	16,129,348	17,473,875	7,612,170	2,432,352	1,073,250	14,422,763	292,044	3,051,112	90.8	98.4	42.8	13.7	6.0	81.2	1.6	17.2

Table 21 - STATUS OF BLISTER RUST CONTROL, BY STATES AND LAND OWNERSHIP CLASSES, IN THE NET CONTROL AREA OF THE NORTHEASTERN REGION - SEPTEMBER 30, 1953

State	Land Ownership	Total Control Area	Acreage of White Pine	Acreage Detail Mapped	Net Acreage Worked: Pre-Maintenance Work: First	Net Acreage Worked: Pre-Maintenance Work: Second	Net Acreage Worked: Pre-Maintenance Work: Other	Net Acreage Worked: Maintenance Work	Acreage in Control Area: Now on Maintenance	Acreage in Control Area: In Need of Pre-Maintenance Work: First Work	Acreage in Control Area: In Need of Pre-Maintenance Work: Rework	Percentage of Control Area: Detail Mapped	Percentage: Worked: Pre-Maintenance: First	Percentage: Worked: Pre-Maintenance: Second	Percentage: Worked: Pre-Maintenance: Other	Percentage: Worked: Maintenance	Percentage: On Maintenance	Percentage: In Need of Pre-Maintenance Work: First Work	Percentage: In Need of Pre-Maintenance Work: Rework
Maine	State and Private	2,276,509	893,804	2,135,775	2,154,375	1,478,501	428,729	48,917	1,382,155	122,134	772,220	93.8	94.6	64.9	18.8	2.1	60.7	5.4	33.9
N. H.	"	2,623,808	1,220,744	1,808,574	2,595,952	1,720,459	288,303	50,329	1,493,638	27,856	1,102,314	68.9	98.9	65.6	11.0	1.9	56.9	1.1	42.0
Vt.	"	725,864	174,400	718,126	645,051	233,324	44,862	12,828	502,838	80,813	142,213	98.9	88.9	32.1	6.2	1.8	69.3	11.1	19.6
Mass.	"	1,463,999	594,521	1,068,720	1,461,399	1,163,218	217,389	1,875	1,340,693	2,600	120,706	73.0	99.8	79.5	14.8	.1	91.6	.2	8.2
R. I.	"	147,778	64,018	138,613	147,778	141,390	34,068	104,440	147,778	-	-	93.8	100.0	95.7	23.1	70.7	100.0	-	-
Conn.	"	459,504	95,448	459,504	459,504	307,584	129,643	285,205	459,504	-	-	100.0	100.0	66.9	28.2	62.1	100.0	-	-
N. Y.	"	2,365,846	752,693	2,133,084	2,334,513	1,893,625	1,055,955	488,471	1,750,642	31,333	583,871	90.2	98.7	80.0	44.6	20.6	74.0	1.3	24.7
N. J.	"	16,742	3,771	-	16,742	1,417	-	-	16,742	-	-	-	100.0	8.5	-	-	100.0	-	-
Pa.	"	486,631	104,291	484,586	483,329	313,739	75,834	60,485	418,939	3,302	64,390	99.6	99.3	64.5	15.6	12.4	86.1	.7	13.2
Del.	"	6,186	242	6,186	6,186	-	-	-	6,186	-	-	100.0	100.0	-	-	-	100.0	-	-
Ga.	"	324,452	248,576	324,452	324,452	678	441	-	324,302	-	150	100.0	100.0	.2	.1	-	99.9	-	.1
Ky.	"	114,312	31,199	114,312	114,312	-	-	-	114,312	-	-	100.0	100.0	-	-	-	100.0	-	-
Md.	"	163,994	70,625	163,994	163,994	17,166	27,595	-	152,434	-	11,560	100.0	100.0	10.5	16.8	-	93.0	-	7.0
N. Car.	"	1,362,155	581,785	1,362,155	1,362,155	4,654	2,161	-	1,359,462	-	2,693	100.0	100.0	.3	.2	-	99.8	-	.2
S. Car.	"	77,008	45,398	77,008	77,008	25,935	-	-	77,008	-	-	100.0	100.0	33.7	-	-	100.0	-	-
Tenn.	"	1,066,781	466,280	1,066,781	1,066,781	12,794	5,236	-	1,059,854	-	6,927	100.0	100.0	1.2	.5	-	99.4	-	.6
Va.	"	1,526,650	554,228	1,526,650	1,508,701	39,686	13,337	8,868	1,449,268	17,949	59,433	100.0	98.8	2.6	.9	.6	94.9	1.2	3.9
W. Va.	"	621,547	242,352	621,547	620,972	117,890	22,715	1,399	512,709	575	108,263	100.0	99.9	19.0	3.7	.2	82.5	.1	17.4
Sub-Total	State and Private	15,829,766	6,144,375	14,210,067	15,543,204	7,472,060	2,346,268	1,062,817	12,568,464	286,562	2,974,740	89.8	98.2	47.2	14.8	6.7	79.4	1.8	18.8
							National	Forests											
Me. & N. H.	White Mountain	5,379	2,000	5,379	5,379	5,136	2,874	1,070	4,797	-	582	100.0	100.0	95.5	53.4	19.9	89.2	-	10.8
Vt.	Green Mountain	2,308	544	2,308	2,308	115	-	-	2,308	-	-	100.0	100.0	5.0	-	-	100.0	-	-
Pa.	Allegheny	4,085	957	4,085	4,085	3,530	1,495	240	3,970	-	115	100.0	100.0	86.4	36.6	5.9	97.2	-	2.8
Ga.	Chattahoochee	349,903	295,902	349,903	349,903	330	97	-	349,713	-	190	100.0	100.0	.1	.1	-	99.9	-	.1
Ky.	Cumberland	32,002	16,980	32,002	32,002	65	65	-	32,002	-	-	100.0	100.0	.2	.2	-	100.0	-	-
N. Car.	Nantahala	62,709	42,138	62,709	62,709	7	-	-	62,695	-	14	100.0	100.0	.1	-	-	99.9	-	.1
N. Car.	Pisgah	161,752	92,701	161,752	161,752	2,828	1,730	-	158,670	-	3,082	100.0	100.0	1.7	1.1	-	98.1	-	1.9
S. Car.	Sumter	53,862	18,794	53,862	53,862	3,700	-	-	53,862	-	-	100.0	100.0	6.9	-	-	100.0	-	-
Tenn.	Cherokee	484,948	250,092	484,948	484,948	2,103	41	-	482,516	-	2,432	100.0	100.0	.4	.1	-	99.5	-	.5
Va.	Jefferson	107,514	55,084	107,514	107,514	4,571	2,147	1,264	102,905	-	4,609	100.0	100.0	4.3	2.0	1.2	95.7	-	4.3
Va.& W.Va.	Geo. Washington	424,973	191,267	424,973	419,491	86,337	58,960	4,221	368,139	5,482	51,352	100.0	98.7	20.3	13.9	1.0	86.6	1.3	12.1
W. Va.	Monongahela	89,559	46,854	89,559	89,559	11,606	7,415	450	84,176	-	5,383	100.0	100.0	13.0	8.3	.5	94.0	-	6.0
Sub-Total	National Forests	1,778,994	1,013,313	1,778,994	1,773,512	120,328	74,824	7,245	1,705,753	5,482	67,759	100.0	99.7	6.7	4.2	.4	95.9	.3	3.8
							National	Parks											
Maine	Acadia	16,872	3,200	-	16,872	11,271	4,979	3,228	16,872	-	-	-	100.0	66.8	29.5	19.1	100.0	-	-
New York	Saratoga Battlefield	955	166	955	955	955	955	-	-	-	955	100.0	100.0	100.0	100.0	-	-	-	100.0
N.C.& Va.	Blue Ridge	13,663	6,042	13,663	13,663	2,087	276	-	12,104	-	1,559	100.0	100.0	15.3	2.0	-	88.6	-	11.4
N.C.& Tenn.	Great Smoky	110,954	67,905	110,954	110,954	457	617	-	104,855	-	6,099	100.0	100.0	.4	.6	-	94.5	-	5.5
Va.	Shenandoah	14,270	3,080	14,270	14,270	5,012	4,433	-	14,270	-	-	100.0	100.0	35.1	31.1	-	100.0	-	-
Sub-Total	National Parks	156,714	80,393	139,842	156,714	19,782	11,260	3,228	148,101	-	8,613	89.2	100.0	12.6	7.2	2.1	94.5	-	5.5
							Indian	Service											
N. Car.	Cherokee Ind. Res.	445	22	445	445	-	-	-	445	-	-	100.0	100.0	-	-	-	100.0	-	-
GRAND TOTAL	All Ownerships	17,765,919	7,238,103	16,129,348	17,473,875	7,612,170	2,432,352	1,073,290	14,422,763	292,044	3,051,112	90.8	98.4	42.8	13.7	6.0	81.2	1.6	17.2

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White Pine Blister Rust Control Project

PROGRAM ANNUAL REPORT

North Central Region

Calendar Year 1953

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
REGION V
IN COOPERATION WITH OTHER
FEDERAL, STATE, COUNTY, AND LOCAL AGENCIES.

RESTRICTED — FOR ADMINISTRATIVE USE ONLY

Dr. Martin

Report of

WHITE PINE BLISTER RUST CONTROL

NORTH CENTRAL REGION, 1953

by

Henry N. Putnam
Pathologist

and

John K. Kroeber
Pathologist

Blister Rust Control Program Annual Report

North Central Region, Calendar Year 1953

Section A. Summary

Statement of Problem

White pine blister rust is an introduced fatal disease of white pine requiring for the completion of its life cycle, two hosts: (1) white pines, and (2) currant and gooseberry bushes, collectively known as ribes. The rust, distributed by windborne spores, cannot spread directly from pine to pine. Spores (aecia) produced on infected pines in the spring are carried to ribes bushes, often many miles away (up to 100 miles or more), where they infect the leaves. During the summer the rust is intensified on ribes leaves through infection by summer spores (uredospores). Later in the summer and early fall, pine infecting spores (sporidia) are produced on ribes leaves. These spores are very delicate and short-lived. They dry out and become harmless a short time after they leave the ribes bushes. Control of the rust consists in removing ribes from within pine stands, and from a zone up to 900 feet around them. In this Region, which embraces the States of Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio and Wisconsin, the rust is well established in the pine growing portions. The problem is one of protecting individual pine stands, rather than any hope of eradicating the disease.

Purpose of Control Program

The general purpose is to establish and maintain ribes-free, or nearly ribes-free, conditions in and around valuable white pine stands of all ownerships. The immediate objective is to provide the largest amount and most needed protection that funds will permit. Prior to each field season, specific plans are worked out and agreed upon between our organization and the various land-managing agencies, such as the U. S. Forest Service, the U. S. Indian Service, State and other agencies and individuals who are concerned with growing white pine.

Values Involved

No exact figures on the extent of the original pineries in the three Lake States (Michigan, Wisconsin and Minnesota) are available, because at that time no accurate maps existed, and the idea was that the virgin pine resources were inexhaustible. It has been estimated that these pineries occupied about 33,000,000 acres in the northern portions of the three Lake States. (This represents about 60 percent of the now existing forested area.) At the present time white pine occupies about 4,000,000 acres. About one-quarter of this acreage, (1,182,505 acres), chiefly young stands, is considered of sufficient value to protect from blister rust. Since the wet cycle started in 1937, there has been a steady increase in stocking and extension of pine areas through natural reproduction. White pine also continues to be widely used in reforestation plantings.

In January, 1952, a reappraisal of present and potential commercial pine values was made. Foresters and lumbermen in various parts of the Region were consulted. The present and potential value of white pine within the regional control area has been calculated to be $467,000,000 at the present time. Of this the U. S. Forest Service owns 12.4 percent; the U. S. Indian Service, 6.2 percent; state, county and municipal agencies, 28.5 percent; and private interests 52.9 percent.

Damage

Damage from blister rust is insidious, cumulative, and not spectacular. Rarely is every tree in a stand killed. The smaller the tree, the more quickly it can be killed by the rust. While trees in the reproduction size class are killed in three to five years after infection, it may require twenty or more years to kill the larger trees. Blister rust is most damaging to young, vigorous trees, which are future crop trees. Presence of ribes bushes in a stand prevents the establishment of white pine reproduction. In such infected areas the rust destroys the white pine seedlings as soon as they appear.

Examples of damage in unprotected stands are common, especially in the northern parts of the three Lake States. In Houghton County, Michigan, in 1936, a study was made of infection in an unprotected roadside planting where trees ranged up to 6 feet in height. At that time, out of 106 trees examined, 89 were infected, and 2 had already been killed by the rust. Examination of this area a few years later showed that all trees had been killed.

In Vilas County, Wisconsin, a school forest of planted white pine covering a couple of acres was established about 15 years ago and was never protected. The surviving trees are now about 25 feet tall. Recent examination revealed that 80 percent of the trees were infected (with 50 percent already killed). The best trees in the stand succumbed to the rust.

An example of damage to unprotected young mature trees is at Beaver Bay, a few miles northeast of Two Harbors, Minnesota, on the north shore of Lake Superior. This stand of 135 acres, primarily of white pine, about 70 years old and 40 to 60 feet tall, is very heavily damaged. In November, 1952, a study was made of an acre selected at random. Most of the 121 trees examined were in the 6 to 14 inch d.b.h. classes. Of the 121 trees examined, 11 had been killed, 101 fatally infected, and 9 not fatally infected. Tops of many of the trees had been killed, and secondary fungi and insects were causing deterioration of the wood. While some salvage cutting could be made now, the stand will not reach commercial maturity for another 30 to 50 years. By that time it is probable that none of these trees will be worth harvesting.

Cooperation

The Bureau of Entomology and Plant Quarantine is responsible for the over-all leadership, coordination and technical direction of the work on lands of all ownerships. In cooperation with state and local authorities, it is directly responsible for work on state and private lands. On the basis of work plans agreed upon, control work is done on white pine stands owned by the U. S. Forest Service; U. S. Indian Service; state, county, municipal agencies; lumber and power companies; and private agencies.

Under the Lea Act, in the discretion of the U. S. Secretary of Agriculture, state and private sources must contribute at least half of the costs of work on state and private lands. During Calendar Year 1953, state and private agencies contributed nearly twice as much as the federal government for work on non-federal lands. Cooperative relationships with all public land managers are excellent. The relationship with private pine owners is also good but finances for protecting privately-owned pine still fall far short of meeting the need.

Status of Program

For all ownerships in this Region, the total acreage of valuable white pine listed for protection is 1,182,505 acres. To protect this acreage it is necessary to remove ribes from 3,638,528 acres of control area.

The program of protecting white pine against blister rust is fairly well on schedule for stands of public ownership, but is greatly lagging on privately-owned lands, as shown in the following percentages, based on control areas:

Status of Control by Ownership Classes

Ownership	Total Control Area (Acres)	Percent of Acreage Initially Worked	Percent of Acreage On Maintenance
U. S. Forest Service	313,018	91.5	69.1
U. S. Indian Service	138,328	97.3	71.4
Non-Federal Public	926,193	91.4	45.1
Private	2,260,989	81.4	36.2
Total	3,638,528	85.4	42.6

There remain approximately 531,000 acres of control area needing initial work, and 1,558,000 acres needing rework, or a total of practically 2,100,000 acres. This year 110,311 acres of all ownerships were cleared of ribes. This rate of protection is far from enough to keep ahead of the disease. It must be recognized that blister rust is here to stay, and that blister rust control is a necessary white pine management activity, if young white pine stands are to survive to commerciable maturity.

Accomplishments During 1953

Local Control

In 1953, to give protection to 51,968 acres of white pine, 1,728,660 ribes were removed from 110,311 acres of control area at a cost of 13,303 man days. Nearly half of the acreage covered in 1953 was initial work.

About 34,000 acres of control area were placed on maintenance. Through the use of Bureau-State funds, 81,528 acres of state and private lands were worked using 6,045 man-days; Forest Service funds were used in

working 13,944 acres at a cost of 4,389 man-days; and the Indian Service worked 9,839 acres using 2,869 man-days. Our Bureau directly hired and paid the labor and supervised work agreed upon on the Lower Michigan, Upper Michigan, Ottawa, Nicolet, Chequamegon, and Chippewa National Forests, and was later reimbursed from Forest Service funds. Work on the Superior National Forest and on all of the Indian Reservations was administratively handled by the agencies concerned, with the Bureau furnishing work plans, training, technical supervision, checking and record keeping, as it did on work of other ownerships.

Surveys

Surveys are necessary to maintain an up-to-date inventory of the control problem; to deduct acres lost through fire, disease, etc.; and to add acres due to newly found areas, increased through natural reproduction or planting.

Three kinds of surveys are made: Pre-eradication, Resurvey, and Postcheck. Pre-eradication surveys consist of mapping newly established white pine areas about which nothing was known previously. The map shows extent of white pine that is considered worth protecting from blister rust, distribution of ribes, control area to be cleared of ribes, and location of infection. An accompanying data sheet gives all pertinent information as to ownership of the pine, degree of stocking, amount of ribes, degree of pine infection, and estimate of man-days of work needed to protect the area. No area is worked until this preliminary survey is made and it is determined that the pine values involved warrant the cost of protection.

Resurvey is simply the bringing up to date of the map and data sheet of an area that was mapped years before but for some reason was not protected. If the area still appears to warrant protection and it seems likely that the owner or agency is willing and able to do so, the area is resurveyed. A change in the economic situation, availability of labor, accessibility, or the owner's attitude toward the value of his stand, often results in the protection of an area that has been neglected since the original survey was made.

Postcheck survey is the re-examining of an area which had been worked five or more years earlier. The main object is to determine whether or not ribes are returning to the area and the size of the bushes. Since control can only be established by eliminating the ribes population, it is important that bushes that were missed earlier because of their small size or those resulting from seed, be destroyed before they reach seed bearing age. The time lapse between eradications is determined by the probability of ribes regeneration. To make this determination a postcheck survey is necessary. In the same operation change in the size of the area and condition of the pine is determined.

Surveys are essential to intelligent planning and carrying out of control operations. In 1953, pre-eradication surveys of new areas were made on 70,497 acres, resurveys were made on 4,495 acres of old areas, and post-check surveys were conducted on 91,972 previously worked acres.

Nursery Sanitation

There are 43 white pine producing nurseries in the Region around which ribes-free conditions are being maintained by periodic inspection. Eight of these nurseries were examined and worked in 1953. This resulted in removal of 36,124 ribes from 2,551 acres of control area at a cost of 475 man-days. These eight nurseries contained more than 14 million white pine seedlings and transplants.

Canker Pruning

Canker pruning is not a control measure. It simply is a means of preserving white pines which had become infected before nearby ribes were destroyed. By removing cankered branches before the rust mycelium reaches the trunk many otherwise protected pines can be saved. Only crop trees in protected stands are treated. In 1953 a total of 10,275 trees were so treated at a cost of 495 man-days.

Cultivated Black Currant Elimination

The program of systematically removing this most susceptible of the ribes from pine growing counties was completed about 10 years ago. However, several "hold outs" remain. During 1953, in Michigan, 261 cultivated black currant plants in 3 locations were destroyed by Michigan State Nursery Inspectors.

Informational Activities

Informal talks at conferences and in classrooms, newspaper articles, radio talks, exhibits, demonstrations, escorted tours, showings of our blister rust films and distribution of literature, served to keep the public informed about blister rust and its control. A paragraph included in nursery stock price lists and planting instructions urged the planting of white pines on ribes-free sites. This is a very effective method of bringing blister rust control information to white pine planters. Direct personal contact of field men with pine owners is still the best means of bringing about immediate tangible results in cooperative control. In one visit the BRC man can point out pine values, rust conditions, ribes concentrations, and make recommendations to the owner. Frequently the owner elects to start control work, after being shown how to do it, in this first contact.

Changes in Operations and Trends

Ribes eradication on a contract basis, started in this Region last year, was expanded in 1953. Fourteen contracts were awarded involving work on 2,240 acres of control area with payment of $3,108.00 to the contractors. Results compared favorably with work accomplished by hourly-paid crews but were not significantly better. Experienced ribes eradicators looking for work, were scarce in this period of high employment. Eradication work by contract will be continued but it is felt that the full benefits of this type of labor will not be realized until there is keener competition for jobs.

Ribes eradication in the dormant season is being expanded. Upright growing ribes plants that are easily recognized even when defoliated can readily be destroyed with chemicals. The use of these herbicides permits treating the bushes even when the ground is frozen. The only limiting factors are small and recumbent bushes which cannot easily be seen, and deep snow.

Owner participation in the protection of stands made up of numerous small ownerships has always been a problem. This year a new approach was tried in Wisconsin. The District Leader called a community meeting to which all pine owners in the Ojibwa area were invited. The need for blister rust control was explained and each pine owner was encouraged to contribute his time or money in proportion to the size of his pine holdings. It became a cooperative project with the BRC organization providing the technical direction and the pine owners the labor. This project was very successful. The key to its success was getting the owners together and convincing them that only through concerted cooperative effort could their pines be saved from blister rust. It is planned to approach other communities having comparable conditions on a similar basis in the future.

The stocked quadrat method of stand appraisal has worked out very satisfactorily on the National Forests. Briefly this method of survey provides information on ultimate crop trees of all commercial species in a stand. A standard of limiting cost of control to not exceed one man day per five thousand board feet of expected yield of pine is a practical criterion in evaluating control work. This method and standard is now being applied to pine stands of all ownerships.

Further effort was made to increase state and local participation in the control program. In 1953, states, counties, and private individuals contributed nearly twice as much as the Federal government toward the protection of state and privately-owned pine. This appears to be about the limit because the Federal share is used for providing skilled supervision to direct local labor. The local agencies do not care to provide more labor than can be effectively supervised.

Changes in Financing

For the third year the Bureau in 1953 used its own funds in hiring and payrolling labor for control work on the Upper Michigan, Ottawa, Nicolet, Chequamegon and Chippewa National Forests. Later the Bureau was reimbursed for such work from Forest Service funds. The advantage of this procedure is that seasonal labor can be employed continuously through the eradication season regardless of the land ownership they work on. Any work on National Forests, of course, was done according to mutually agreed upon plans, and total funds available for each Forest were known.

Changes in Organization

After the changes made in 1952 the BRC organization became stabilized. There were no changes in 1953.

Changes in Distribution of Blister Rust

Infection on pine was found for the first time in 1953 in Tama County, Iowa, and Milwaukee and Racine Counties, Wisconsin. This brings the total number of counties in which pine infection has been found in the Region to 195. Of the 622 counties in the North Central Region, blister rust infection on ribes has been found in 390.

While the number of counties in which blister rust infection was found for the first time in 1953 does not denote much of a spread to new territory, a high degree of intensification of the rust has taken place in counties previously reported. The years 1950 and 1951 were particularly favorable for the spread of the rust and the resulting cankers are only now becoming conspicuous.

The year 1953 cannot be considered particularly favorable for the spread of the rust on pine. Unusually wet weather prevailed in spring and early summer, which favored heavy ribes infection. However, the unseasonably long dry spell that followed from early July until late fall was not conducive to rust spread from ribes to pine, so no unusual wave year is expected. The uredinial stage died out in necrotic areas and ribes leaves dropped early because of the dryness.

Research Results and Their Effect on Program

Examination in the spring of 1953 of experimental chemical ribes plots which had been treated the year previous revealed that a good kill was obtained. Of the various hormone type herbicides that were used, 2,4,5-T appears to be consistently most effective. Applied as a basal spray, 18,000 p.p.m. 2,4,5-T in fuel oil, it killed all species of gooseberries and upright growing currants that were treated either in summer or winter. Failure to kill some bushes was due more to improper application than the inadequacy of the chemical. Each stem must be treated to achieve complete kill of the plant. In the case of large upright growing bushes, such as pasture gooseberries and American black currants, chemical eradication is the answer for more economical control. It is being used wherever conditions warrant, and saves time. Further study is needed to perfect more suitable spray equipment for application of chemicals.

Studies in the treatment of swamp species of ribes were continued. Dr. L. W. Melander gave valuable assistance in initiating these studies. It was found that certain chemicals, such as 2,4,5-T, Chloro IPC, MCP, and CMU are toxic to ribes when applied in a solution of fuel oil. The difficulty in eradicating some species of swamp ribes lies in their recumbent habit of growth and association with other brush. To accomplish effective eradication of these hard to find ribes requires broadcast spraying of the entire ground area. This is expensive when using fuel oil as the diluent. Further studies are in progress to find an effective low cost chemical which can be applied in a water solution. In the meantime, the treatment of swamp ribes on a practical basis must be confined to areas having heavy ribes concentrations. Hand pulling is still the most practical means of eradicating ribes that are scattered, where searching time is greater than time required by treatment.

In Illinois, the year round treatment of ribes with chemicals was confirmed by Mr. Bergeson on both an experimental and practical basis. Since only gooseberry and American black currant bushes occur there, they can all be treated chemically. Nearly all of the ribes eradication work that was done in Illinois in 1953 was with chemicals.

A series of ribes eradication plots in heavy upland brush was established in Wisconsin to determine the efficiency of operation at various times of the year. Time studies were made on acre plots at two-month intervals, eradicating ribes by uprooting, and with chemicals. A careful count of ribes and feet of live stem eradicated was kept. The full significance of these tests will be known after a check of ribes remaining is made under optimum conditions next spring. From the time factor alone, it now appears that gooseberries growing in heavy brush can be found and eradicated more quickly when all vegetation is dormant. If the quality of work is found to be as good as that attained in summer, the saving in time will dictate that upland brushy areas containing gooseberries can best be worked in fall and early winter. There are thousands of acres of this type of area that needs initial work. Proof that it is feasible and economical will extend the length of the ribes eradication season several months.

Recommendations

While it is not yet known what the Blister Rust Control policy will be when the Project is transferred to the U. S. Forest Service, the following recommendations are believed to be in the interest of the work regardless of the agency administering it.

It is recommended that ribes eradication by the use of chemicals in the dormant season continue to be expanded wherever practicable. This applies particularly to the southern part of the Region where ribes are of a kind that can easily be seen while dormant and where deep snow is seldom encountered.

Because of the relative scarcity of rust on white pines in Indiana and Ohio, the high proportion of white pine acreage placed on maintenance through work already done, and because of apparently unfavorable conditions for spread of rust, it is recommended that the major responsibility for control operations in these states be turned over to them. Federal participation can be limited to periodic scouting for the rust and lending technical assistance when needed. If a serious outbreak of the rust threatens in the future, federal personnel can resume a more active part in the program.

Ribes eradication by the contract method should be continued wherever practicable and where qualified bidders are available. It is believed that this method will be even more successful as competition for work becomes keener.

It is recommended that Blister Rust Control personnel, when available, be given assignments in the detection and suppression of other forest diseases and insect pests. This will extend their usefulness in forest protection and broaden their scope of interest.

Because blister rust is continuing to cause severe losses in unprotected valuable pine stands in the northern sections of Wisconsin, Michigan and Minnesota, it is recommended that every effort be made to intensify control work there. Although protection of publicly-owned areas is on schedule, many intermingled privately-owned stands go unprotected and consequently are lost. Efforts are being made to stimulate a larger amount of state and private participation. However, these sources are already contributing nearly twice as much as federal agencies toward the protection of this young pine and it is difficult to expand the ratio without a corresponding increase of federal participation. Availability of federal funds for use on intermingled lands within the gross National Forest boundaries would help materially in getting this pine protected.

Changes in Federal and State Laws Affecting Program

Federal and State laws affecting blister rust control in this Region are adequate. There were no changes in 1953.

Summary of White Pine Blister Rust Control - December 31, 1953

NORTH CENTRAL REGION

White Pine Being Protected: 1,182,505 Acres. Estimated Value $467,000,000

Status of Control (Net Acres)

Item	Forest Service (Acres)	Indian Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	149,325	82,032	352,284	598,864	1,182,505	-
Total Control Area	313,018	138,328	926,193	2,260,989	3,638,528	100.0
Worked Initially	286,566	134,553	846,777	1,839,983	3,107,879	85.4
On Maintenance	216,413	98,832	417,478	817,526	1,550,249	42.6
Needing Initial Work	26,452	3,775	79,416	421,006	530,649	14.6
Needing Re-Work	70,153	35,721	429,299	1,022,457	1,557,630	44.8

Local Control, 1953

Operating Agency	Acres Worked: Initial	Acres Worked: Re-Work	Acres Worked: Total	Ribes Destroyed	Man-Days Used	Per Acre: Ribes	Per Acre: Man-Days
Bureau-State	46,653	34,875	81,528	985,234	6,045	12.1	0.07
Forest Service	4,809	14,135	18,944	525,363	4,389	27.7	0.23
Indian Service	854	8,985	9,839	218,063	2,869	22.2	0.29
Total	52,316	57,995	110,311	1,728,660	13,303	15.7	0.12

Blister Rust Infection, 1953: On pine initially in Tama County, Iowa; Milwaukee and Racine Counties, Wisconsin. Cumulative: Known on pines and ribes in all seven states; on white pine in 195 counties; on ribes in 390 of the 622 counties in the region. Large numbers of cankers of 1950 and 1951 origin appearing. Rust most severe in north.

Nursery Sanitation, 1953: 8 nurseries worked: one each in Iowa, Ohio, Minnesota; 5 in Wisconsin. Cumulative: Ribes-free zones being maintained around 43 nurseries producing about 25 million white pine trees yearly, of the 92 nurseries originally protected.

Canker Pruning, 1953: 12,555 cankers removed from 10,275 trees; 1,210 fatally infected trees destroyed in Iowa, Michigan, Minnesota, Wisconsin. Cumulative: 235,323 cankers removed to save 132,988 trees; 13,359 fatally infected trees destroyed.

Surveying and Checking, 1953: 70,497 acres control area initially surveyed; 8,082 acres re-surveyed and 4,495 acres retained; 96,445 acres post-checked and 91,972 acres retained; 100,513 acres checked for ribes after eradication and 100,136 acres, or 99.6 percent found satisfactory.

Cultivated Black Currant Elimination, 1953: 3 plantings, 261 plants found and destroyed in Michigan. Cumulative: 35,888 plantings, 298,927 plants found; 34,960 plantings, 292,712 plants destroyed.

Control Area Permits, 1953: 395 applications received; 349 approved; 8 rejected and 38 voluntarily cancelled.

Summary of White Pine Blister Rust Control - December 31, 1953

ILLINOIS

White Pine Being Protected: 2,180 Acres. Estimated Value $1,700,000

Status of Control (Net Acres)

Item	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	1,329	851	2,180	-
Total Control Area	6,693	4,784	11,477	100.0
Worked Initially	6,579	4,533	11,112	96.8
On Maintenance	1,485	594	2,079	18.1
Needing Initial Work	114	251	365	3.2
Needing Re-Work	5,094	3,939	9,033	78.7

Local Control, 1953

Operating Agency	Acres Worked			Ribes Destroyed	Man-Days Used	Per Acre	
	Initial	Re-Work	Total			Ribes	Man-Days
Bureau-State	495	1,673	2,168	160,148	354	73.9	0.16

Blister Rust Infection, 1953: No new counties. Cumulative: Found in northern Illinois in 7 counties; on ribes in 24 of the 102 counties in the state. Cankers of 1950 and 1951 origin found in 1953.

Nursery Sanitation, 1953: None. Cumulative: Ribes-free zones being maintained around 2 of the 8 nurseries originally protected.

Surveying and Checking, 1953: 588 acres of control area initially surveyed; 802 acres post-checked, and all retained; 2,104 acres given regular check after ribes eradication and all found satisfactory.

Cultivated Black Currant Elimination, 1953: None. Cumulative: 532 plantings with 4,171 plants found; 60 plantings with 761 plants destroyed.

Summary of White Pine Blister Rust Control - December 31, 1953

INDIANA

White Pine Being Protected: 10,747 Acres. Estimated Value $7,000,000

Status of Control (Net Acres)

Item	Forest Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	18	3,169	7,560	10,747	-
Total Control Area	179	18,209	74,196	92,584	100.0
Worked Initially	179	17,322	61,983	79,484	85.9
On Maintenance	170	15,723	51,013	66,915	72.3
Needing Initial Work	-	887	12,213	13,100	4.1
Needing Re-Work	-	1,599	10,970	12,569	13.6

Local Control, 1953

Operating Agency	Acres Worked: Initial	Acres Worked: Re-Work	Acres Worked: Total	Ribes Destroyed	Man-Days Used	Per Acre: Ribes	Per Acre: Man-Days
Bureau-State	385	1,688	2,073	1,287	16	0.6	0.01

Blister Rust Infection, 1953: No new counties. Cumulative: On white pine in 3 counties; on ribes in 53 of the 92 counties in the state.

Nursery Sanitation, 1953: None. Cumulative: Sanitation zones being maintained around 3 of the 6 nurseries originally protected.

Canker Pruning, 1953: None. Cumulative: 11 cankers removed from 8 trees.

Surveying and Checking, 1953: 407 acres control area initially surveyed; 2,088 acres post-checked, and 1,688 acres retained; 1,842 acres given regular check after eradication and all found satisfactory; 1,973 acres placed on maintenance.

Cultivated Black Currant Elimination, 1953: None. Cumulative; 5 plantings, 20 plants found; 3 plantings, 15 plants destroyed.

Summary of White Pine Blister Rust Control - December 31, 1953

IOWA

White Pine Being Protected: 3,129 Acres. Estimated Value $5,000,000

Status of Control (Net Acres)

Item	Indian Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	50	589	2,490	3,129	-
Total Control Area	500	3,678	10,554	14,732	100.0
Worked Initially	500	3,614	6,664	10,778	73.2
On Maintenance	206	199	2,055	2,460	16.7
Needing Initial Work	-	64	3,890	3,954	26.8
Needing Re-Work	294	3,415	4,609	8,318	56.5

Local Control, 1953

Operating Agency	Acres Worked Initial	Acres Worked Re-Work	Acres Worked Total	Ribes Destroyed	Man-Days Used	Per Acre Ribes	Per Acre Man-Days
Bureau-State	9	561	570	38,373	227	67.3	0.40

Blister Rust Infection, 1953: On pine initially on Tama Indian Reservation, Tama County. Many cankers of 1950 and 1951 origin found in previously infected counties. Cumulative: On white pine in 11 counties in northeast; on ribes in 56 of the 99 counties in the state.

Nursery Sanitation, 1953: Fort Atkinson Nursery, private, re-worked for third time. Cumulative: Ribes-free zones maintained around 7 of the 9 nurseries originally protected.

Canker Pruning, 1953: 284 cankers removed from 211 trees; 152 fatally infected trees destroyed. Cumulative: 984 trees saved by removing 2,298 cankers from them; 908 fatally infected trees destroyed.

Surveying and Checking, 1953: 73 acres re-surveyed, and 108 acres retained; 786 acres post-checked, and all retained; 446 acres given regular check after ribes eradication and found satisfactory. In 1953, permanent records of all 99 counties gone over, and all shelterbelts and other areas of less than one acre of pine thrown out. This reduced control problem from 6,005 acres of white pine, and 50,775 acres of control area to 3,129 and 14,732 acres respectively.

Cultivated Black Currant Elimination, 1953: None. Cumulative: 1,612 plantings with 7,335 plants found; 1,607 plantings, with 7,314 plants destroyed.

Summary of White Pine Blister Rust Control - December 31, 1953

MICHIGAN

White Pine Being Protected: 421,963 Acres. Estimated Value $225,000,000

Status of Control (Net Acres)

Item	Forest Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	67,269	133,594	221,100	421,963	-
Total Control Area	173,500	315,681	733,279	1,222,460	100.0
Worked Initially	168,220	290,614	636,669	1,095,503	89.6
On Maintenance	133,299	164,479	245,913	543,691	44.5
Needing Initial Work	5,280	25,067	96,610	126,957	10.4
Needing Re-Work	34,921	126,135	390,756	551,812	45.1

Local Control, 1953

Operating Agency	Acres Worked Initial	Re-Work	Total	Ribes Destroyed	Man-Days Used	Per Acre Ribes	Man-Days
Bureau-State	5,062	15,625	20,687	221,624	2,035	10.7	0.10
Forest Service	630	3,560	4,190	105,798	814	25.3	0.19
Total	5,692	19,185	24,877	327,422	2,849	13.2	0.11

Blister Rust Infection, 1953: No new counties. Many cankers of 1950 and 1951 origin found. Cumulative: On white pine in 55 counties; on ribes in all of the 83 counties in the state.

Nursery Sanitation, 1953: None. Cumulative: Ribes-free zones being maintained around 9 of the 15 nurseries originally protected.

Canker Pruning, 1953: 3,408 cankers removed from 2,911 trees. Cumulative: 112,646 cankers removed to save 56,071 trees; 520 fatally infected trees destroyed.

Surveying and Checking, 1953: 21,942 acres control area initially surveyed; 1,924 acres re-surveyed and 1,050 acres retained; 31,741 acres post-checked, and 33,694 acres retained; 24,662 acres checked after ribes eradication, and 24,572, or 99.6 percent found satisfactory.

Cultivated Black Currant Elimination, 1953: 3 plantings with 261 plants found and destroyed by state inspectors. Cumulative: 15,039 plantings, 151,407 plants found; 15,026 plantings, 151,145 plants destroyed.

Control Area Permits, 1953: 96 applications received; 69 approved; 2 rejected; 25 voluntarily cancelled.

Summary of White Pine Blister Rust Control - December 31, 1953

MINNESOTA

White Pine Being Protected: 208,079 Acres. Estimated Value $40,500,000

Status of Control (Net Acres)

Item	Forest Service (Acres)	Indian Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	40,748	20,750	56,746	89,835	208,079	-
Total Control Area	64,421	30,827	116,029	281,800	493,077	100.0
Worked Initially	49,465	30,784	76,557	211,734	368,540	74.7
On Maintenance	33,370	22,831	24,041	40,826	121,068	24.6
Needing Initial Work	14,956	43	39,472	70,066	124,537	25.3
Needing Re-Work	16,095	7,953	52,516	170,908	247,472	50.1

Local Control, 1953

Operating Agency	Acres Worked Initial	Acres Worked Re-Work	Acres Worked Total	Ribes Destroyed	Man-Days Used	Per Acre Ribes	Per Acre Man-Days
Bureau-State	559	850	1,409	122,282	1,011	86.8	0.72
Forest Service	1,525	2,100	3,625	195,315	1,714	53.9	0.47
Indian Service	232	5,472	5,704	120,888	1,040	21.2	0.18
Total	2,316	8,422	10,738	438,485	3,765	40.8	0.35

Blister Rust Infection, 1953: No new counties. Cumulative: On pines in 39 counties; on ribes in 38 of the 87 counties in the state. Rust prevalent in all pine growing counties, especially severe in northeastern Minnesota.

Nursery Sanitation, 1953: Badoura State Nursery re-worked for 8th time. Cumulative: Ribes-free zones maintained around 4 of the 17 nurseries originally protected.

Canker Pruning, 1953: 4,062 cankers removed from 3,008 trees; 130 fatally infected trees destroyed. Cumulative: 84,552 cankers removed to save 49,550 trees; 6,564 fatally infected trees destroyed.

Surveying and Checking, 1953: 1,278 acres of control area initially surveyed; 3,195 acres re-surveyed, and 1,846 acres retained; 29,212 acres post-checked, and 28,431 acres retained; 10,645 acres checked after ribes eradication, and 10,358 acres, or 97.3 percent, found satisfactory.

Cultivated Black Currant Elimination, 1953: None. Cumulative: 3,261 plantings with 23,309 plants found and destroyed.

Control Area Permits, 1953: 79 applications received; 66 approved; 13 voluntarily cancelled.

Summary of White Pine Blister Rust Control - December 31, 1953

OHIO

White Pine Being Protected: 24,134 Acres. Estimated Value $14,000,000

	Status of Control (Net Acres)				
Item	Forest Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	515	9,844	13,775	24,134	-
Total Control Area	4,029	55,795	152,021	211,845	100.0
Worked Initially	4,029	44,349	128,024	176,402	83.3
On Maintenance	4,029	20,872	76,709	101,610	48.0
Needing Initial Work	-	11,446	23,997	35,443	16.7
Needing Re-Work	-	23,477	51,315	74,792	35.3

Local Control, 1953

Operating Agency	Acres Worked Initial	Re-Work	Total	Ribes Destroyed	Man-Days Used	Per Acre Ribes	Man-Days
Bureau-State	2,573	3,562	6,335	3,001	55	0.5	0.01

Blister Rust Infection, 1953: No new counties. Cumulative: On pine in 10 counties; on ribes in 65 of the 88 counties in the state.

Nursery Sanitation, 1953: Henry Kohankie private nursery given 7th re-working. Cumulative: Ribes-free zones maintained around 7 of the 16 nurseries originally protected.

Canker Pruning, 1953: None. Cumulative: 126 cankers removed to save 44 trees; 13 fatally infected trees destroyed.

Surveying and Checking, 1953: 2,086 acres of control area initially surveyed; 1,494 acres re-surveyed, and 200 acres retained; 9,099 acres post-checked and 3,930 acres retained; 3,699 acres checked after ribes eradication and found satisfactory.

Cultivated Black Currant Elimination, 1953: None. Cumulative: 8,838 plantings, 75,605 plants found; 8,406 plantings, 73,117 plants destroyed.

Control Area Permits, 1953: 19 applications received; 13 approved; 6 rejected.

Summary of White Pine Blister Rust Control - December 31 1953

WISCONSIN

White Pine Being Protected: 512,273 Acres. Estimated Value $273,000,000

Status of Control (Net Acres)

Item	Forest Service (Acres)	Indian Service (Acres)	Non-Fed. Public (Acres)	Private (Acres)	Total (Acres)	Percent of Total
W.P. in Control Area	40,775	61,232	147,013	263,253	512,273	-
Total Control Area	70,889	107,001	410,108	1,004,355	1,592,353	100.0
Worked Initially	64,673	103,269	407,742	790,376	1,366,060	85.8
On Maintenance	45,536	75,795	190,679	400,416	712,426	44.7
Needing Initial Work	6,216	3,732	2,366	213,979	226,293	14.2
Needing Re-Work	19,137	27,474	217,063	389,960	653,634	41.1

Local Control, 1953

Operating Agency	Acres Worked Initial	Re-Work	Total	Ribes Destroyed	Man-Days Used	Per Acre Ribes	Man-Days
Bureau-State	37,570	10,716	48,286	438,519	2,347	9.1	0.05
Forest Service	2,654	8,475	11,129	224,250	1,861	20.2	0.17
Indian Service	622	3,513	4,135	97,175	1,829	23.5	0.44
Total	40,846	22,704	63,550	759,944	6,037	12.0	0.09

Blister Rust Infection, 1953: Infection found for first time in Milwaukee and Racine Counties. Cumulative: On white pine in 70 counties; on ribes in all 71 counties in the state.

Nursery Sanitation, 1953: Boscobel State, and Marathon County Nurseries worked for first time; Hayward and Gordon State Nurseries worked for 10th time; Griffith State Nursery worked for 11th time. Cumulative: Ribes-free zones maintained around 12 of the 21 nurseries originally protected.

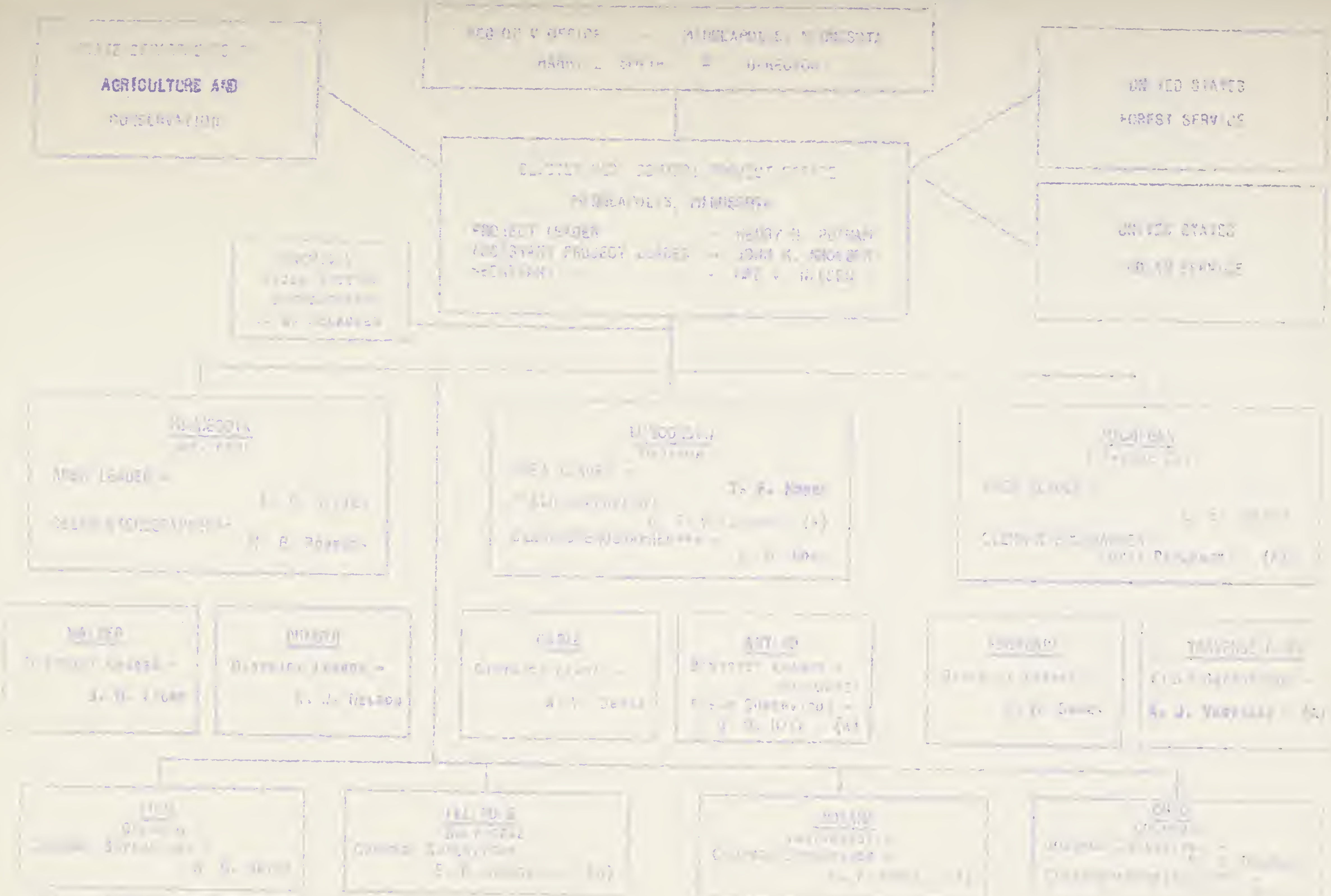
Canker Pruning, 1953: 4,801 cankers removed from 4,145 trees; 928 fatally infected trees destroyed. Cumulative: 35,690 cankers removed to save 26,331 trees; 5,354 fatally infected trees destroyed.

Surveying and Checking, 1953: 44,196 acres control area initially surveyed, 1,396 acres re-surveyed, and 1,291 acres retained; 22,717 acres post-checked and 22,641 acres retained; 57,115 acres checked after ribes eradication, and all found satisfactory.

Cultivated Black Currant Elimination, 1953: None. Cumulative: 6,601 plantings, 37,080 plants found; 6,597 plantings, 37,051 plants destroyed.

Control Area Permits, 1953: 201 applications received, and all approved.

ORGANIZATION CHART NORTH CENTRAL REGION, AS OF DECEMBER 31, 1959



Section B. Control Activities

Foreword

Section A of this report is designed to give an over-all picture of progress in and present status of the blister rust control program in Region V. Section B will include details on which summaries are based, both tabular and narrative; separate excerpts covering work on National Forests and Indian Reservations; and basic tables. Section B is designed primarily as a reference for use of project personnel in providing a permanent record of accomplishments useful in planning and directing field operations. Where subjects are adequately covered in Section A, they will not be repeated in Section B.

Authorization

As in the past, the work in 1953 was continued under Memoranda of Agreement drawn up between the responsible State Agencies and the Bureau of Entomology and Plant Quarantine.

Organization

The organization shown in Chart 1 at the end of the year previous to transfer of the Blister Rust Control Project to the Forest Service is the same as at the end of 1952. No immediate change is contemplated, other than the transfer of Project headquarters from Minneapolis to Milwaukee.

Labor Conditions

As in previous years, labor was largely made up of local people commuting to and from work areas. In Michigan, state prisoners from near-by honor camps were again effectively used. One Blister Rust Control camp on the Superior National Forest was operated, manned both by college students and local woodsmen. Indians of both sexes were used on Indian Reservations. In general the quality of labor was good. The total man-month employment (Table 11) in 1953 was 963 man-months, as compared with 926 in 1952. In 1953, there was an average of about 200 persons in the summer (peak of 255 in June) and from 19 to 30 persons during the winter months.

Wage rates for Bureau employees, as established by the Bureau Wage Board on May 19, 1953, were the highest that have been used. Authorized wage rates for the seven states in the North Central Region were as follows:

Laborer I	$1.20	per	hour
Laborer II	1.30	"	"
Laborer III	1.40	"	"
Crew Leader	1.45	"	"
Truck Driver	1.35	"	"
Foreman-Scout	1.50	"	"
Foreman	1.60	"	"

Laborers employed on National Forests were paid at rates authorized for each Forest. Forest Service rates were generally lower than Bureau rates. Wage rates on Indian Reservations were close to those on National Forests. Wages paid from state, county and private sources varied considerably.

Surveys

Results of surveys, necessary to maintain a current inventory of white pine, are shown in Table 1, by states and type of survey. These surveys were performed chiefly by key personnel when not engaged in supervising control operations. Reductions in acreages in the control problem, due to blister rust, fire, logging, etc., were more than offset by additions due to natural reproduction and planting. There were net increases in acres of pine in all of the states except Minnesota, where a small decrease was recorded. For the Region as a whole, surveys resulted in a net increase of 42,471 acres of white pine and 62,437 acres of control area. The largest net increase occurred in Wisconsin.

The stocked quadrat survey method, for determining white pine values, developed in 1952, was used in 1953. See the 1952 report for a description of this method.

Local Control in 1953

Local control accomplishment in 1953 was somewhat less than in 1952. For all ownerships and workings, 51,968 acres of white pine were given protection by the removal of 1,728,660 ribes from 110,311 acres of control area using 13,303 man-days of labor in 1953. About half the acreage worked in 1953 was initial and half was rework. Details of work done in 1953 are given in Tables 2 and 3.

On the basis of ownership classes, approximately 28 percent of the acreage worked in 1953, was privately-owned; 45 percent was owned by non-federal public agencies; 18 percent by the U. S. Forest Service, and 9 percent by the U. S. Indian Service.

The use of the contract method to eradicate ribes, started in 1952 with one contract, was expanded. During 1953, 14 contracts, involving 2,240 acres and costing $3,108.25, were awarded. None of these was for $500 or more. They were all for work on national forests, 9 in Michigan, 1 in Minnesota, and 4 in Wisconsin. The chief limiting factor in awarding contracts for ribes eradication is the absence of qualified bidders. As more contracts are let, the reservoir of experienced bidders will increase. One advantage of this method is that the successful bidder can work on his own time with full emphasis on doing a good job because he knows he will be paid for thoroughness of the job rather than time on the job. The advantage to the Government lies in the fact that no supervision, timekeeping or payrolling is involved. It is hoped that the contract method may be employed in protecting privately-owned white pine.

Under proper safeguards a private owner would know beforehand just what it would cost him to protect his pine and he would be assured of a satisfactory job before he would pay.

The use of chemicals to eradicate ribes on a practical basis was expanded in 1953. Chemical eradication was employed to a greater or less degree to kill upright growing ribes - Ribes americanum, R. cynosbati, R. missouriense - in all of the states except Michigan. All ribes eradication in Illinois was by use of chemicals, chiefly 2,4,5-T in fuel oil, applied as a basal spray. Bushes sprayed averaged 74 per acre, or 452 per man day. The regional average for all ribes eradication in 1953 was 12 bushes per acre or 163 bushes per man day. Where bushes are abundant, it seems evident that less time is involved in chemically treating ribes than in pulling them. Final check on chemically treated ribes will be done in the spring of 1954.

Checking after eradication (Table 4) showed that work of satisfactory quality had been done on practically all areas. Based on 1,802.8 acres of strip checked, there was an average of 2.4 ribes bushes with 5.1 feet of live stem per acre found after eradication on 100,513 acres worked and checked. All but 377 acres, or 99.6 percent, of this acreage showed less than the allowable 25 feet of live stem per acre. In addition, 9,798 acres were worked, but not formally checked, either because insufficient ribes were found to justify the cost of a formal check, or checking was postponed to the spring of 1954.

Status of Control

In Tables 6 and 7, the status of control in the Region is given by states and districts and by ownership classes, respectively. The 1,182,505 acres of white pine and 3,638,528 acres of control area of all ownerships at the end of 1953, represent a net increase of 26,440 acres of white pine. This increase was in all ownership classes and was composed of additional acres of natural reproduction and planting found on surveys. During 1953, permanent records in 99 counties in Iowa were reviewed and drastically reduced by removing all areas, mostly shelterbelts, having less than one acre of pine. The result was to reduce the acreage of white pine from 6,005 to 3,129, and control area from 50,775 to 14,732. The net regional gain included these reductions. Ignoring these reductions, the actual gain of white pine in the region in 1953 amounted to about 29,300 acres of white pine and 44,000 acres of control area.

The objective of blister rust control is to protect all valuable white pine stands against the disease by establishing and maintaining a condition of ribes suppression on the 3,638,528 acres of control area. To date initial work has been done on 85 percent of the control area, and 43 percent of it is on maintenance.

The program is fairly well on schedule for all classes of public ownership, especially the Indian Service and Forest Service, but lags far behind in private ownership. Of the approximate 2,100,000 acres of initial and rework remaining to be done, nearly 1,500,000 acres are privately owned.

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Cumulative Ribes Eradication

Table 8 shows the cumulative gross acres worked, ribes destroyed and man-days used since the BRC Program was started in this Region. Considering all workings and all states, over 263 million ribes have been removed from over 5,200,000 acres of control area. Table 8 is simply a record of work done. Many acres shown as initially worked in Table 8, are no longer in the control problem because of logging, fire, plantation failure, etc.

Nursery Sanitation

Eight white pine growing nurseries, 5 state, 1 county and 2 private, were worked for ribes in 1953. (See Table 9). These nurseries contain over 14 million white pine trees for reforestation purposes. Ribes-free zones are being maintained around 43 nurseries, producing an estimated 25 million white pine trees annually, in this Region. These nurseries and their environs are checked periodically for ribes.

Control Area Permits

In accordance with Federal Quarantine 63, Michigan, Minnesota, Ohio and Wisconsin are white pine control area states. Ribes cannot be shipped into designated control areas except under a permit issued by the proper State Plant Quarantine Officer. As noted in Table 5, 395 applications for ribes shipping permits were received in 1953, 349 were approved, 8 were rejected, and 38 were voluntarily withdrawn.

Cultivated Black Currant Elimination

While the cultivated black currant elimination phase of the control program was essentially completed several years ago, a few plantings remained due to the reluctance of owners to give them up. In recent years, Michigan Bureau of Plant Industry Inspectors, in the course of their regular travel, have been picking up these occasional "hold outs". During 1953 they destroyed 261 bushes in 3 plantings.

Canker Pruning

Canker pruning in 1953 was done in Iowa, Michigan, Minnesota and Wisconsin (Table 12). Only crop trees in protected stands were pruned. The work was done during the dormant season. On the Nicolet National Forest, Wisconsin, an economic study of canker pruning was conducted. Three areas were selected in plantations 12 to 17 years old, with white pine averaging 10 feet in height. Control had been accomplished but cankers originating prior to ribes eradication were present. The crew consisted of two men experienced in blister rust control. They pruned 36,610 crop trees on 175 acres, using 65 man days. Thus they pruned 210 crop trees per acre, 563 trees per man day, at a cost of about 2 cents per tree.

Experimental Chemical Eradication of Ribes

The use of chemicals in treating ribes was continued and expanded wherever practicable. Since 2,4-D is very toxic to *Ribes americanum*, it was used wherever large clumps of these plants were encountered.

Basal application of 2,4,5-T in fuel oil was used extensively in treating *R. cynosbati*, *R. missouriense*, and *R. oxyacanthoides*. This method was used both in the growing and in the dormant season. Successful treatment of *R. oxyacanthoides* with chemicals is especially significant because it is almost impossible to remove them completely from the rocks in which they grow by mechanical means.

Effective treatment of swamp species of ribes such as *R. glandulosum*, *R. triste* and *R. hirtellum* has not yet been achieved. The trouble lies not in the availability of toxic herbicides but in method of application. Some swamp ribes have a recumbent habit of growth and are usually partly hidden by associate plants making them hard to find and treat. To obtain a satisfactory kill, the brush must be parted and considerable area must be treated to insure complete coverage. So far, 2,4,5-T or similar herbicide, in fuel oil has been found to be the most effective herbicide. Since large amounts of solution are needed to insure adequate coverage, it becomes more expensive than hand pulling. The answer seems to be finding an inexpensive herbicide that can be used in water solutions that will kill swamp ribes.

The BRC Project was fortunate in having the cooperation of Dr. L. W. Melander of the Barberry Eradication Project, in furthering studies in the chemical eradication of ribes. He gave technical assistance and advice in establishing a series of chemical ribes eradication plots in Minnesota and Wisconsin. Preliminary observations indicate that in addition to 2,4,5-T, several other new herbicides are toxic to ribes. Included are: Chloro IPC, MCP and CMU.

Informational Activities

An important function of the BRC organization is to tell people what blister rust is, the damage it can do, and how it can be controlled. The pine owner is expected to supply the labor to protect his own pine. The informational phase of the program is, therefore, aimed at helping the pine owner help himself. This is accomplished by showing of the two blister rust movies, by newspaper articles, by talks to interested groups and by direct contact with pine owners. Also, a very effective means of informing planters of white pine is a brief statement on blister rust and its control sent out with price lists and planting instructions by nurseries.

Funds

The control program in 1953, as in recent years, was financed from several funds: Federal, State, other Public, and Private.

Bureau W-a funds were used for Leadership, Coordination, and Technical Direction for control work on lands of all ownerships.

Bureau W-e funds were used directly in the field for on-the-ground supervision and some labor, for work on State and Private lands.

U. S. Forest Service funds, which were used by the Bureau to protect white pine on National Forests, were spent chiefly for labor, direct supervision, and transportation.

U. S. Indian Service funds were used almost exclusively for the employment of Indians on Reservations. In addition, the Menominee Tribe contributed a substantial amount toward the employment of its people for ribes eradication on the Menominee Indian Reservation.

The several states provided cash allotments as well as labor and facilities for work on non-federal lands. Counties, municipalities, corporations and private pine owners also provided cash or labor for control work on their lands. Combined, the states and other non-federal cooperators contributed cash and services in the ratio to Bureau (W-e) matching funds of 1.75 to 1.

BLISTER RUST CONTROL ON NATIONAL FORESTS

NORTH CENTRAL REGION, 1953

Objective

The objective of blister rust control is to establish and maintain protection against this disease around all valuable white pine stands and forest nurseries administered by the Forest Service. This involves suppression of ribes bushes within infecting distances of white pine stands and maintenance of these conditions.

Memorandum of Understanding

Under a Memorandum of Understanding, the Forest Service is responsible for selection of white pine areas to be protected, and for payment of labor and supervision to do the necessary control work. Beginning in the spring of 1951, and continuing through 1953, on all forests except the Superior, the Bureau has been responsible for hiring, payrolling and supervising all labor doing ribes eradication. The Bureau pays these men and is later reimbursed from Forest Service funds through 1080 procedure. The Bureau is also responsible for preparing work plans and maps, training labor and supervision, checking on adequacy of work, keeping records, and making necessary reports on all national forests.

On the Superior National Forest, the Forest Service operated a camp and employed labor direct. However, there was the usual close cooperation between the Forest Service and the Bureau in the training and supervision of labor.

General Status of Control

As may be seen in Text Table 2, there are 149,325 acres of white pine listed for protection in the 313,018 acres of control area on the national forests in this Region. This is an increase of 4,559 acres of white pine and 4,721 acres of control area shown at the end of 1952. These increases occurred chiefly as new natural pine areas coming in on the Chequamegon and Nicolet, and additional plantings on the Lower Michigan National Forests. For all of the eleven Forests listed, 91.5 percent of the white pine has been initially worked, and 69.1 percent of it is on maintenance. A total of 12,379 acres of control area was placed on maintenance in 1953. There is practically no control problem on the Wayne and Hoosier Forests where there are very few ribes. Blister rust control is fairly well on schedule on all of the forests in the Region except the Superior. Initial control has been completed, or nearly so, on all Forests except the Superior, Huron and Chequamegon. Practically 54 percent of the remaining initial work on national forests is on the Superior. A considerable amount of rework is necessary on the Forests in Minnesota, Wisconsin and Upper Michigan. About 96,400 acres of initial and rework remain to be done on all Forests.

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Surveys

The white pine acreage in the forests of the Region is increasing through natural reproduction and planting. During the year an additional 4,559 acres of pine were mapped.

In mapping pine areas, the recently adopted stocked quadrat method of survey is used. This method is superior to the old system, which was based primarily on number of stems per acre, by size classes. The stocked quadrat method takes into account all factors which will have a bearing on the ultimate character and yield of the stand. It stresses ultimate crop trees based on vigor and distribution. Due consideration is given to trees of all commercial species in a stand. Under this method of evaluation an area to be classed as a white pine stand must show promise of producing sufficient white pine to justify the cost of protection from blister rust; that is, an area should show promise of producing at least 5 M board feet of white pine per man day required for control work.

The adoption of standards expressed in reference tables has materially improved the understanding by all concerned as to what pine areas warrant the cost of protection.

Local Control

In Text Table 1, local control work done in 1953 by Forests and workings is shown. A total of 2,760 acres of white pine was given initial protection. Through surveys, 4,559 acres of white pine were added to the control problem. Hence, at the end of 1953, there were nearly 1,800 more acres of white pine needing initial work than at the end of 1952.

Control work was done in 1953 on seven Forests. There were 92 separate areas worked, 11,019 acres of white pine protected by removing 525,363 ribes from 19,429 acres at a cost of 4,391 man days. About one-quarter of the acreage covered was initial, and three-quarters was rework. About 12,380 acres of control area were placed on maintenance in 1953.

Contract Ribes Eradication

The use of the contract method to eradicate ribes, started with one contract on the Nicolet National Forest in 1952, was expanded in 1953. During this year, 14 negotiated contracts, involving 2,240 acres and costing $3,108.25, were awarded. None of these was for $500 or more. Although some rework was necessary, checking showed satisfactory work. All of the work on the Manistee Unit, 8 contracts, was done by the contract method. Mr. R. I. Thompson, retired District Leader, was the experienced contractor. One contract each was let on the Upper Michigan and Chippewa and two each on the Nicolet and Chequamegon National Forests. The chief limiting factor in awarding ribes eradication contracts is the absence of qualified bidders. As more contracts are let, the reservoir of experienced bidders will increase. One big advantage of the contract method is that the successful bidder works on his own time with full attention to doing a good job rather than the number of hours worked. The advantage to the Government is that no supervision, timekeeping or payrolling is involved.

Checking

Thorough ribes eradication was done in 1953, as shown by a 2 percent check on 18,815 acres worked. There was an average of 4.4 bushes and 7.6 feet of live stem per acre left after working. This is well below the allowable maximum of 25.0 feet of live stem per acre. Of the 18,815 acres worked, 18,568, or 98.7 percent checked satisfactory. Rework is planned on the 247 acres on the Chippewa which did not pass the check.

Canker Pruning

To save young white pines, infected prior to ribes eradication, canker pruning of selected crop trees was performed on the Chequamegon and Nicolet National Forests. This work was done in the dormant season, not only because less damage from pruning was done to the trees when they were dormant, but also the period of profitable employment of experienced men was lengthened. In 1953, 3,810 branch cankers were pruned from 3,340 young crop trees, using 122 man days.

Forest Service Costs, 1953

As given in Text Table 3, $70,165.54 of Forest Service funds were spent for field operations in blister rust control. As seen in the following table, most of these funds ($65,723.48) were spent in ribes eradication, with smaller amounts used in surveys and canker pruning. For ribes eradication only, the average regional cost per acre worked was 0.23 man days, or $3.47:

Forest Service Expenditures by Forests and Activities
North Central Region
Calendar Year 1953

Forest	Surveys	Local Control	Canker Pruning	Other	Total
Manistee		$ 761.36			$ 761.36
Upper Michigan		2,537.11			2,537.11
Ottawa		5,462.70			5,462.70
Superior	$2,657.73	33,642.59			36,300.32
Chippewa	381.05	4,340.82		$27.26	4,749.13
Chequamegon		13,779.90	$1,150.42		14,930.32
Nicolet		5,199.00	225.60		5,424.60
Total	$3,038.78	$65,723.48	$1,376.02	$27.26	$70,165.54

The effective man day cost on ribes eradication, derived by dividing the total costs chargeable to ribes eradication by the number of man days actually spent on ribes eradication, by Forests, was as follows:

Forest	Chargeable to Ribes Eradication Man-Days	Cost	Average Cost Per Effective Man-Day
Manistee	68	$ 761.36	$11.20*
Upper Michigan	203	2,537.11	12.50
Ottawa	543	5,462.70	10.06
Chippewa	559	4,340.82	7.77
Chequamegon	1,289	13,779.90	10.69
Nicolet	572	5,199.00	9.09
Sub-total	3,234	32,080.89	9.92
Superior	1,155	33,642.59	29.13
Region Total	4,389	$65,723.48	$14.97

* All contract work.

The average for all National Forests in the Region in 1953 was $14.97, or practically the same as for 1952, $15.14. As in 1952, the cost on the Superior, $29.13 per man day, is high because of the additional cost of camp operation. However, it was $1.38 lower in 1953 than the man day cost of $30.51 in 1952.

Work Plans for Fiscal Year 1955

In accordance with long-time work plans for each Forest, the program for each Forest for Fiscal Year 1955 will include needed work within the limits of funds expected. Specific work plans for Fiscal Year 1955 will be prepared separately.

Status of Control by Forests

A resume' of the status of control on each National Forest on December 31, 1953, follows: More detailed accounts are in the individual reports for each Forest.

Shawnee, Hoosier and Wayne National Forests

No blister rust control has been done or needed in the past few years. Ribes are absent or scarce. All white pine is planted and is now on maintenance. Due to long growing seasons and ample moisture, white pine growth is excellent. Leader growths of four feet annually are common. White pine yields of 50 M board feet per acre from plantations at 50 years of age have been reported from these southern states.

Lower Michigan National Forest

Huron Unit

The only local control in 1953 was done by Bureau personnel who examined 485 acres of control area initially without finding any ribes and placed the areas on maintenance. Survey and scouting was performed by the Bureau. Where seed trees are present, white pine is continuing to become established through natural seeding under oak and aspen.

Surveys in 1953 about doubled the acreage in the control problem. White pine to be protected was increased from 2,533 to 5,473 acres, and the control area from 7,841 to 13,646 acres. The increases were due to natural reproduction. At year's end, 71 percent of control area has been initially worked and 50 percent is on maintenance.

It is planned to work 508 acres, using an estimated 40 man days in the spring of 1954. For Fiscal Year 1955, plans have been made for working practically 6,000 acres on the Tawas District, using 438 man days and costing an estimated $5,000.

Manistee Unit

During 1953, 545 acres of natural white pine were added to the control problem through surveys made by the Bureau on the Cadillac and White Cloud Ranger Districts. All local control was done by the contract method. Mr. R. I. Thompson, retired District Leader, was the experienced contractor. He destroyed 12,936 ribes on 1,425 acres of control area to protect 495 acres of white pine, using 68 man days and costing $761.36. All work was satisfactory. Work planned in 1953 for the Unit and on the White Cloud District in 1954 has been completed.

The control problem, primarily of planted pine, was increased to 25,811 acres of pine, and 77,760 acres of control area. All but 1,090 acres of control area have been given initial working, and 95.5 percent is on maintenance.

Present work plans for the spring of 1954 call for working 2,035 acres, using 33 man days on the Baldwin, Cadillac and Manistee Districts. For the Fiscal Year 1955, it is planned to work 1,908 acres, using 57 man days, on the Cadillac and White Cloud Ranger Districts, costing an estimated $1,500. Contract ribes eradication will be done wherever feasible.

Upper Michigan National Forest

Costs of ribes eradication (Table 3) are not broken down for the Hiawatha and Marquette Units. Total expenditures of Forest Service funds in 1953 were $2,537.11. For both units 1,645 acres were worked, using 203 man days. The cost per acre worked was 0.12 man days, or $1.54. All areas planned for work in 1953 were completed, and a high quality of work was done. One ribes eradication contract was let and successfully fulfilled.

Hiawatha Unit

Ribes eradication was performed on 5 areas on the Hiawatha Unit. Ribes were removed from 1,265 acres of control area to protect 581 acres of white pine, using 105 man days.

All of the 13,272 acres of valuable white pine on the Unit have been given initial working, and 73.8 percent of the control area is on maintenance. There remain 9,325 acres of control area to be reworked.

Plans are being prepared for work in the spring of 1954 and for Fiscal Year 1955.

Marquette Unit

Only 2 areas were covered in 1953, all rework. Ribes were removed from 380 acres of control area to protect 205 acres of white pine, using 98 man days. A small acreage was added to the maintenance column for 1953.

Through surveys the acreage of white pine in the control problem was increased from 11,627 to 11,682 acres. All but 90 acres of control area have been initially worked. However, only 55.3 percent is on maintenance. There remain 11,368 acres of control area needing rework.

Plans are in preparation for work in the spring of 1954 and for Fiscal Year 1955.

Ottawa National Forest

In 1952 and in 1953, a considerable amount of post-check survey by Bureau personnel, using the stocked quadrat method, was accomplished. Because of excessive eradication costs and losses from blister rust, a net of 75 acres of white pine and 713 acres of control area was taken out of the control problem. Much of the white pine on this Forest is in the pole class. Because of heavy soil, and competition from spruce, balsam and hardwoods, pine reproduction is not coming in so generally as on the Upper Michigan National Forest. However, on two areas that were surveyed, abundant white pine reproduction is appearing on the Iron River and Kenton Districts.

In 1953, 8 areas involving 550 acres of pine were protected by removing 78,097 ribes from 1,120 acres of control area, using 543 man days. This work cost $5,462.70 of Forest Service funds. Thus, the average cost per acre worked was 0.48 man days, or $4.88.

All but 200 acres of the 20,703 acres of control area on the Forest have been initially worked, and 55.6 percent is on maintenance. There remain 8,973 acres needing rework.

Plans for the spring of 1954 and for Fiscal Year 1955 are being prepared. Where feasible, this work will be done by contract.

Superior National Forest

In 1951, a re-appraisal of white pine stands on this Forest was completed. This resulted in eliminating more than half of the previous acreage in the control problem. Acres dropped included those in the Roadless and No-cut portions, all alienated lands, and other areas where the cost of protection would be high. This does not mean that areas excluded are of small values. It does mean that because of the high cost of control on this Forest, due to heavy ribes conditions, weather favorable to rust development, and inaccessibility, only the very cream of white pine stands, and those which can be managed as such, will be protected. In 1953, through stocked quadrat surveys, 150 acres of pine and 661 acres of control area were added to the control problem.

Costs to the Forest Service for work in 1953 were $4,749.13, of which $4,340.82 were for ribes eradication, and $408.31 for post-checking. The cost per acre worked was 0.42 man days, or $3.25.

Of the 20,077 acres of control area in the control problem, 19,481 acres, or 97 percent, has been initially worked, and 76.6 percent is on maintenance. There remain nearly 7,000 acres of control area to be worked initially or reworked.

A long-time program has been developed providing for initial working and necessary rework every five years until all areas are on maintenance. The program for spring of 1954 includes post-check work on 2 areas, using 4 man days, and local control on 1,117 acres, using 377 man days. For Fiscal Year 1955, it is proposed to do post-check on 26 areas, using 57 man days, and local control on 1,186 acres, using 465 man days. Some additional work may be listed, as a result of post-check and other surveys. One or two Forest Service Fire Control Aids will continue to devote part of their time to blister rust control in their respective districts.

Chequamegon National Forest

Pre-eradication surveys performed by Bureau personnel in 1953 added 2,354 acres of white pine and 3,640 acres of control area to the control problem. This acreage represents white pine coming in on new areas from existing seed trees. For the past several years, such new areas have been added as a result of surveys. In 1953, as in 1952, the Chequamegon had the largest program of control, including 4,489 acres of pine protected, 7,461 acres worked, 185,004 ribes pulled, and 1,289 man days used, of any of the Forests in the Region. About 18 percent of acreage covered and 64 percent of ribes destroyed were on initial work.

Two ribes eradication contracts were awarded to experienced control workers. The jobs were successfully carried out, although certain portions had to be reworked to fulfill the contract requirements.

Systematic checking after all of the 1953 ribes eradication showed that all work done was satisfactory, with averages of 4.5 bushes, and 7.0 feet of live stem per acre remaining after working. This was well below the allowable average of 25 feet of live stem per acre.

Canker pruning was done in one area of young white pine protected against the rust. To save 2,450 crop trees, 2,815 branch cankers were cut off. This work was done in the dormant season, using 102 man days.

During 1953, $14,930.32 of Forest Service funds were spent on blister rust control, of which $13,779.90 was for ribes eradication, and $1,150.42 for canker pruning. The cost per acre cleared of ribes was 0.17 man days, or $1.85.

Due primarily to natural reproduction, there was an increase of 2,354 acres of white pine in the control problem in 1953 over 1952. Of the 46,053 acres of control area, 87.3 percent has been worked initially, and 63.4 percent is on maintenance. Although good progress was made in 1953, there are actually more acres needing initial work at the end of 1953 than of 1952, because of the new acreage of white pine found in 1953. There are about 17,000 acres of control area still in need of initial or rework before control is accomplished.

Plans for the spring of 1954 call for the working of 1,145 acres, using 406 man days. For Fiscal Year 1955, it is planned to work 4,825 acres, using 1,635 man days. This program is scheduled for the Glidden, Hayward, Park Falls and Washburn Districts. So far as practical, contract ribes eradication will be performed.

Nicolet National Forest

In 1953, to protect 2,040 acres of white pine, 39,246 bushes were removed from 3,668 acres of control area, using 572 man days. There were 14 areas worked, two of them by the contract method. About one-third of the acreage covered was initial, and two-thirds rework. All of the work done was satisfactory, with averages of 3.8 bushes and 5.2 feet of live stem per acre found after working.

In April, 1953, canker pruning was performed in two protected plantations averaging 10 feet in height. Only selected crop trees with no visible trunk cankers, averaging 210 per acre, were pruned. About 11,000 trees were pruned, using 20 man days. The cost per pruned tree was approximately two cents.

Total costs of blister rust control to the Forest was $5,424.60, of which $5,199.00 was for ribes eradication and $225.60 for canker pruning. Thus the cost of ribes eradication per acre was 0.16 man days, or $1.41.

The white pine in the control problem, 12,808 acres, is 339 acres larger than at the end of 1952, due to increases from natural reproduction. Of the 24,836 acres of control area, 98.5 percent has been initially worked, and 65.8 percent is on maintenance. There remain about 8,500 acres needing initial or rework.

Plans for work in the spring of 1954 and for the Fiscal Year 1955, are in process of completion.

Text Table 1. Local Control on National Forests, North Central Regio[illegible],
Calendar Year 1953

(All work performed on Forest Service funds, except on the Huron N.F., where Bureau funds were used)

National Forest	Number Areas Worked	Acres White Pine Protected	Acres Control Area Worked	Ribes Bushes Destroyed	Man-Days Used
		Initial Working			
Huron N.F. Mich.	3	135	485	-	2
Manistee N.F. Mich.	2	100	390	8,052	23
Hiawatha N.F. Mich.	1	96	240	3,347	22
Superior N.F. Minn.	11	499	870	73,251	555
Chippewa N.F. Minn.	8	503	655	34,667	179
Chequamegon N.F. Wis.	7	709	1,314	119,255	907
Nicolet N.F. Wis.	5	718	1,340	19,545	173
Total, Initial	37	2,760	5,294	258,117	1,861
		Second Working			
Manistee N.F. Mich.	2	40	125	358	4
Hiawatha N.F. Mich.	1	70	135	547	12
Ottawa N.F. Mich.	2	75	240	49,659	239
Superior N.F. Minn.	5	346	461	18,922	234
Chippewa N.F. Minn.	3	117	253	22,516	191
Chequamegon N.F. Wis.	1	90	128	19,746	125
Nicolet N.F. Wis.	1	50	115	1,249	39
Total, Second	15	788	1,457	112,997	844
		Third and Other Workings			
Manistee N.F. Mich.	9	355	910	4,526	41
Hiawatha N.F. Mich.	3	415	890	3,839	71
Marquette N.F. Mich.	2	205	380	7,032	98
Ottawa N.F. Mich.	6	475	880	28,438	304
Superior N.F. Minn.	5	702	958	33,094	366
Chippewa N.F. Minn.	5	357	428	12,865	189
Chequamegon N.F. Wis.	2	3,690	6,019	46,003	257
Nicolet N.F. Wis.	8	1,272	2,213	18,452	360
Total, Third and Other	40	7,471	12,678	154,249	1,686
		All Workings			
Huron N.F. Mich.	3	135	485	-	2
Manistee N.F. Mich.	13	495	1,425	12,936	68
Hiawatha N.F. Mich.	5	581	1,265	7,733	105
Marquette N.F. Mich.	2	205	380	7,032	98
Ottawa N.F. Mich.	8	550	1,120	78,097	543
Superior N.F. Minn.	21	1,547	2,289	125,267	1,155
Chippewa N.F. Minn.	16	977	1,336	70,048	559
Chequamegon N.F. Wis.	10	4,489	7,461	185,004	1,289
Nicolet N.F. Wis.	14	2,040	3,668	39,246	572
Total, All Workings	92	11,019	19,429	525,363	4,391

Text Table 2. Status of Control on National Forests, North Central Region, on December 31, 1953

National Forest	Total Acres		Acres Initially Worked		Percent Control Area		Acres Control Area Requiring		
	White Pine	Control Area	White Pine	Control Area	Initially Worked	On Maintenance	Initial Work	Re-Work	Maintenance Work
Hoosier N.F. Ind.	18	179	18	179	100.0	100.0	-	-	179
Wayne N.F. Ohio	515	4,029	515	4,029	100.0	100.0	-	-	4,029
Huron N.F. Mich.	5,473	13,646	3,633	9,746	71.4	50.0	3,900	2,915	6,831
Manistee N.F. Mich.	25,811	77,760	25,189	76,670	98.5	95.5	1,090	2,340	74,330
Hiawatha N.F. Mich.	13,272	35,701	13,272	35,701	100.0	73.8	-	9,325	26,376
Marquette N.F.Mich.	11,682	25,690	11,627	25,600	99.6	55.3	90	11,368	14,232
Ottawa N.F. Mich.	11,031	20,703	10,921	20,503	99.0	55.6	200	8,973	11,530
Superior N.F.Minn.	28,905	44,344	22,468	29,984	67.6	40.5	14,360	12,002	17,982
Chippewa N.F.Minn.	11,843	20,077	11,683	19,481	97.0	76.6	596	4,093	15,388
Chequamegon N.F.Wis.	27,967	46,053	24,036	40,202	87.3	63.4	5,851	10,999	29,203
Nicolet N.F. Wis.	12,808	24,836	12,628	24,471	98.5	65.8	365	8,138	16,333
Total	149,325	313,018	135,990	286,566	91.5	69.1	26,452	70,153	216,413

Text Table 3. Forest Service Funds Spent on Blister Rust Control, North Central Region, Calendar Year 1953

National Forest	January-June 1953	July-December 1953	Calendar Year 1953
Manistee N.F. Mich.	$ 200.00	$ 561.36	$ 761.36
Upper Mich. N.F. Mich.	-	2,537.11	2,537.11
Ottawa N.F. Mich.	1,399.55	4,063.15	5,462.70
Superior N.F. Minn.	15,325.81	20,974.51	36,300.32
Chippewa N.F. Minn.	2,118.08	2,631.05	4,749.13
Chequamegon N.F. Wis.	5,491.22	9,439.10	14,930.32
Nicolet N.F. Wis.	4,377.13	1,047.47	5,424.60
Total	$ 28,911.79	$ 41,253.75	$ 70,165.54

BLISTER RUST CONTROL ON INDIAN RESERVATIONS, 1953

NORTH CENTRAL REGION FINANCIAL PROJECT BLR-7

Objective

The objective is to establish and maintain blister rust protection around white pine stands of economic value on forest lands administered by the Indian Service. This involves suppression of ribes within infecting distances of white pine stands and maintenance of these conditions.

Memorandum of Understanding

Under a Memorandum of Understanding, the Indian Service is responsible for the selection of white pine areas to be protected, and the employment of labor and supervision. The Bureau of Entomology and Plant Quarantine is responsible for preparing work plans and maps, training of labor and supervision, checking on adequacy of control work, keeping records, and making periodic reports of work done.

General Status of Control

As may be seen in Text Table 5, control is being established and maintained on 82,032 acres managed for white pine and selected by the Indian Service on 11 reservations. Control work on Indian Service white pine stands is up-to-date with 97.3 percent of the control area initially worked and 71.4 percent of it on maintenance. In spite of the fact that disease conditions on the reservations are generally favorable for the spread of the rust, timely control work has prevented serious damage.

Most of the initial work remaining consists of areas of newly established natural reproduction. Initial working of 3,775 acres and rework of 35,721 acres are scheduled for future years.

Current Work, 1953

In Text Table 4, control work done in 1953 on 6 of the reservations is shown. Of the 9,839 acres worked, all but 854 acres was rework. All work done in 1953 was in accordance with a long-time control program for each reservation developed jointly between members of the Indian Service and the Blister Rust Organization.

On the basis of a 2 percent check for ribes after eradication, all of the acreage was satisfactorily worked and checked as having less than 25 feet of live stem per acre.

Expenditures in 1953

Expenditures for ribes eradication on Indian lands during Calendar Year 1953 are shown in Text Table 6. These costs are exclusive of assistance given by employees of the Bureau of Entomology and Plant Quarantine. The cost per effective man day, based on 2,869 man days used on ribes eradication (Text Table 4) was $11.33.

Status of Control by Reservations

A brief discussion of blister rust control on each Reservation follows. See separate reports for each reservation for more detail.

Sac-Fox Reservation - Iowa

This Reservation has 50 acres of fast growing planted pine with a control area of 500 acres. All of it was initially worked in the middle 30's, partially reworked in 1944, and completely reworked in 1951 and 1952.

Grand Portage Reservation - Minnesota

This Reservation, located in the northeastern tip of Minnesota, has 1,097 acres of white pine with 1,496 acres of control area. All pine and control area have been initially worked and the necessary rework has been done when due. Local control here is the most expensive of any of the reservations. Ribes are very abundant, particularly in the numerous narrow valleys which cut across the white pine areas. Pine infection is extremely severe on the adjacent Canadian side and on other unprotected pine areas. In the protected areas, however, rust is not severe. This is good proof of the effectiveness of control work done so far.

In 1953, initial work was done on 202 acres, from which 79,249 ribes were removed. None of the white pine has been placed on maintenance because ribes have not been suppressed to a sufficient degree.

Leech Lake Indian Reservation - Minnesota

The 1,257 acres of white pine, listed in the control area of 1,867 acres, lie entirely in that portion of the Reservation known as the "Onigum Unit", on a large peninsula extending into Leech Lake. About 57 percent of the white pine is on maintenance. The white pine stand on the Leech Lake Reservation is one of the best stocked stands owned by the Indian Service in this Region. In 1953, initial work was done on 30 acres and rework on 120 acres. A total of 15,347 ribes was destroyed.

Nett Lake Indian Reservation - Minnesota

This Reservation has 5,212 acres of white pine in its control area of 7,079 acres. All of this acreage has been initially worked and 88 percent of it is on maintenance. Pine infection is scattered lightly throughout the protected pine and is quite heavy in unprotected white pine stands.

Vermilion Indian Reservation - Minnesota

The control problem on this Reservation consists of 78 acres of natural pine and 186 of control area. Following the fifth working in 1949, the entire acreage was placed on maintenance. Only a very small amount of rust can be found on the pine. This again brings out the effectiveness of control since the area originally had a very heavy ribes population and is located where climatic conditions are very favorable for the spread of the rust.

White Earth Indian Reservation - Minnesota

The blister rust control problem here consists of 502 acres of white pine included in a control area of 1,056 acres. Initial and rework have kept blister rust infection to a minimum. The last ribes eradication was done in 1947. Over half of the area is now on maintenance.

Red Lake Indian Reservation - Minnesota

The Red Lake Indian Reservation has 12,604 acres of white pine in its control problem of 19,143 acres. This is over half the total white pine acreage of all of the Indian reservations in Minnesota. The main body of white pine occurs on Ponemah Point. Rust conditions are not severe. Ribes abundance varies from very heavy in the swamps, to light in the sandy, upland soils. Logging in the area has stimulated ribes regeneration making rework necessary. Considering the ribes concentration and the climatic conditions favorable for the spread of the rust, the light infection indicates that control measures to date have been both timely and effective. All of the white pine has been initially worked and approximately 77 percent is on maintenance.

Extensive logging of mature red and white pine on this Reservation has disturbed ribes conditions to the extent that surveys are necessary before an intelligent rework program can be prepared on these cut-over areas. In 1953, combination post-check and ribes eradication crews covered 5,352 acres from which they removed 26,292 ribes.

Bad River Indian Reservation - Wisconsin

The Bad River Reservation has 8,547 acres of white pine with a control area of 15,023 acres. 90 percent is on maintenance. No control work was performed on this Reservation in 1953.

Lac Court Oreilles Indian Reservation - Wisconsin

The Lac Court Oreilles Reservation has 14,174 acres of white pine with a control area of 25,485 acres. White pine is on the increase through natural reproduction. This Reservation has a considerable acreage which is adapted to white pine which no doubt will continue to fill in as more trees reach seed-bearing age. Over 98 percent of the white pine on this Reservation has been initially worked and about 65 percent is on maintenance. The remaining initial work consists primarily of newly found young white pine stands.

Indian crews were employed during most of the eradication season. Five separate areas, totalling 1,481 acres of white pine, were protected during 1953 by working 2,496 acres of control zone and destroying 29,498 ribes. This was all rework.

Lac du Flambeau Indian Reservation - Wisconsin

The Lac du Flambeau Reservation, like the Lac Court Oreilles, has some very good white pine sites that are steadily increasing as new reproduction comes in. The Reservation has 14,411 acres of white pine in 26,001 acres of control zone. The present status of control is: 100 percent of the white pine has been initially worked and 94 percent is on maintenance.

During 1953, a four-man crew protected 3 areas having 450 acres of white pine. They cleared 584 acres of 6,107 ribes.

Menominee Indian Reservation - Wisconsin

The Menominee contains the largest amount of white pine of all the reservations in this Region. The pine is of all age classes ranging from large saw timber to reproduction which continues to come in on favorable white pine sites. Most of the increase is taking place on the lighter soil types east of the Wolf River where reproduction is becoming established under oak, red pine and jack pine.

The total control problem involves 24,100 acres of white pine and 40,492 acres of control area. Surveys in 1953 brought in an increase of 335 acres due to new acreage restocking to white pine. Besides the acreage in the existing control problem, there is an estimated additional 10,000 acres occupied largely by mature stands of white pine with an estimated volume in excess of 100,000,000 board feet. This acreage will probably not continue in white pine after cutting but will go into hardwoods. If, however, satisfactory white pine reproduction does occur after logging, such acreage will be included in the control problem.

At the end of 1953, a little over 92 percent of the white pine acreage in the control problem had been initially worked and 52.5 percent was on maintenance.

Rust conditions are very heavy in unprotected stands in the vicinity. However, due to effective and timely ribes eradication, the rust has been prevented from doing serious damage on the Reservation. Blister rust is certainly a necessary part of a long-time sustained yield management plan for white pine on this Reservation.

Eradication work was started on May 1, just as ribes leaves were beginning to appear, and continued until June 30.

Crews of Indian women were employed. Each crew averaged four in line and a crew leader behind the line. Field operations were supervised by Indian Service personnel. Technical assistance, in the form of surveys, training, checking and record keeping, was provided by the Bureau of Entomology and Plant Quarantine through the Blister Rust Control District Leader. A total of 545 acres of white pine was protected by working 1,055 acres of control area from which 61,570 ribes were destroyed at a cost of 966 man days. About one-half of the acreage was initial work.

Text Table 4. Local Control on Indian Reservations, North Central Region, Calendar Year 1953

(All work performed on Indian Service or Tribal Funds)

Indian Reservation	Number Areas Worked	Acres White Pine Protected	Acres Control Area Worked	Ribes Bushes Destroyed	Man-Days Used
		Initial Working			
Grand Portage, Minn.	1	123	202	79,249	327
Leech Lake, Minn.	1	13	30	-	1
Lac du Flambeau, Wis.	1	40	92	2,706	42
Menominee, Wis.	3	240	530	51,572	603
Total, Initial	6	416	854	133,527	973
		Second Working			
Lac Court Oreilles, Wis.	2	137	222	5,104	117
Lac du Flambeau, Wis.	2	410	492	3,401	101
Menominee, Wis.	3	305	525	9,998	363
Total, Second	7	852	1,239	18,503	581
		Third and Other Workings			
Leech Lake, Minn.	3	80	120	15,347	80
Red Lake, Minn.	17	4,216	5,352	26,292	632
Lac Court Oreilles, Wis.	3	1,344	2,274	24,394	603
Total, Third and Other	23	5,640	7,746	66,033	1,315
		All Workings			
Grand Portage, Minn.	1	123	202	79,249	327
Leech Lake, Minn.	4	93	150	15,347	81
Red Lake, Minn.	17	4,216	5,352	26,292	632
Lac Court Oreilles, Wis.	5	1,481	2,496	29,498	720
Lac du Flambeau, Wis.	3	450	584	6,107	143
Menominee, Wis.	6	545	1,055	61,570	966
Total, All Workings	36	6,908	9,839	218,063	2,869

Text Table 5. Status of Control on Indian Reservations, North Central Region, on December 31, 1953

Indian Reservation	Total Acres		Acres Initially Worked		Percent Control Area		Acres Control Area Requiring		
	White Pine	Control Area	White Pine	Control Area	Initially Worked	On Maintenance	Initial Work	Re-Work	Maintenance Work
Sac-Fox, Iowa	50	500	50	500	100.0	41.0	-	294	206
Grand Portage, Minn.	1,097	1,496	1,097	1,496	100.0	0.0	-	1,496	-
Vermilion, Minn.	78	186	78	186	100.0	100.0	-	-	186
Nett Lake, Minn.	5,212	7,079	5,212	7,079	100.0	88.1	-	841	6,238
Leech Lake, Minn.	1,257	1,867	1,243	1,824	97.7	57.5	43	751	1,073
White Earth, Minn.	502	1,056	502	1,056	100.0	51.6	-	511	545
Red Lake, Minn.	12,604	19,143	12,604	19,143	100.0	77.2	-	4,354	14,789
Bad River, Wis.	8,547	15,023	8,451	14,846	98.8	90.0	177	1,327	13,519
Lac Court Oreilles, Wis.	14,174	25,485	13,974	25,135	98.6	65.2	350	8,518	16,617
Lac du Flambeau, Wis.	14,411	26,001	14,411	26,001	100.0	93.9	-	1,597	24,404
Menominee, Wis.	24,100	40,492	22,317	37,287	92.1	52.5	3,205	16,032	21,255
Total	82,032	138,328	79,939	134,553	97.3	71.4	3,775	35,721	98,832

Text Table 6. Indian Service and Tribal Funds Spent on Blister Rust Control, North Central Region, Calendar Year 1953

Indian Agency	January-June 1953	July-December 1953	Calendar Year 1953
Consolidated Chippewa, Minn.	$ 4,175.38	$ 1,262.74	$ 5,438.12
Red Lake, Minn.	4,479.00	3,021.00	7,500.00
Great Lakes, Wis.	6,814.41	5,460.69	12,275.10
Menominee (U.S.I.S.) Wis.	3,735.39	-	3,735.39
Menominee Tribal Funds, Wis.	3,556.46	-	3,556.46
Total	$ 22,760.64	$ 9,744.43	$ 32,505.07

Table 1. Surveys Performed in North Central Region, Calendar Year, 1953

State	Type of Survey	Acres Previously Mapped		Acreage Increase		Acreage Decrease		Total Acres Mapped, Net		Man-Days Used
		White Pine	Control Area	White Pine	Control Area	White Pine	Control Area	White Pine	Control Area	
Illinois	Pre-eradication	-	-	115	588	-	-	115	588	7
	Re-Survey	none								
	Post-Check	249	802	17	-	-	-	266	802	1
	Total	249	802	132	588	-	-	381	1,390	8
Indiana	Pre-eradication	-	-	183	407	-	-	183	407	8
	Re-Survey	none								
	Post-Check	396	2,088	25	76	25	476	396	1,688	50
	Total	396	2,088	208	483	25	476	579	2,095	58
Iowa	Pre-eradication	none								
	Re-Survey	19	73	5	35	1	-	23	108	2
	Post-Check	127	786	-	-	-	-	127	786	5
	Total	146	859	5	35	1	-	150	894	7
Ohio	Pre-eradication	-	-	996	2,086	-	-	996	2,086	20
	Re-Survey	100	1,494	35	-	51	1,294	84	200	10
	Post-Check	1,248	9,099	425	728	175	5,897	1,498	3,930	40
	Total	1,348	10,593	1,456	2,814	226	7,191	2,578	6,216	70
Michigan	Pre-eradication	-	-	11,894	21,942	-	-	11,894	21,942	83
	Re-Survey	545	1,924	280	715	420	1,589	405	1,050	6
	Post-Check	13,445	31,741	9,444	9,600	2,075	7,647	20,814	33,694	106
	Total	13,990	33,665	21,618	32,257	2,495	9,236	33,113	56,686	195
Minnesota	Pre-eradication	-	-	466	1,278	-	-	466	1,278	23
	Re-Survey	1,546	3,195	198	318	538	1,667	1,206	1,846	42
	Post-Check	12,720	29,212	240	375	499	1,156	12,461	28,431	100
	Total	14,266	32,407	904	1,971	1,037	2,823	14,133	31,555	165
Wisconsin	Pre-eradication	-	-	20,364	44,196	-	-	20,364	44,196	101
	Re-Survey	375	1,396	7	-	-	105	382	1,291	3
	Post-Check	12,817	22,717	2,658	2,008	1,097	2,084	14,378	22,641	148
	Total	13,192	24,113	23,029	46,204	1,097	2,189	35,124	68,128	252
Region	Pre-eradication	-	-	34,018	70,497	-	-	34,018	70,497	242
	Re-Survey	2,585	8,082	525	1,068	1,010	4,655	2,100	4,495	63
	Post-Check	41,002	96,445	12,809	12,787	3,871	17,260	49,940	91,972	450
	Total	43,587	104,527	47,352	84,352	4,881	21,915	86,058	166,964	755

Table 2. Summary of Local Control by States and Operating Agencies North Central Region, Calendar Year 1953.

State	Operating Agency	Number Areas Worked	Acres White Pine Protected	Acres Worked	Ribes Destroyed	8-Hour Man-Days Used
			Initial Working			
Illinois	Bureau-State	6	95	495	44,448	22
Indiana	Bureau-State	14	177	385	926	7
Iowa	Bureau-State	2	3	9	2,340	6
Ohio	Bureau-State	48	1,127	2,573	1,005	21
Michigan	Bureau-State	25	1,855	5,062	80,856	568
	Forest Service	3	196	630	11,399	45
	Total	28	2,051	5,692	92,255	613
Minnesota	Bureau-State	8	106	559	19,173	177
	Forest Service	19	1,002	1,525	107,918	734
	Indian Service	2	136	232	79,249	328
	Total	29	1,244	2,316	206,340	1,239
Wisconsin	Bureau-State	43	15,435	37,570	355,166	1,367
	Forest Service	12	1,427	2,654	138,800	1,080
	Indian Service	4	280	622	54,278	645
	Total	59	17,142	40,846	548,244	3,092
Region	Bureau-State	146	18,798	46,653	503,914	2,168
	Forest Service	34	2,625	4,809	258,117	1,859
	Indian Service	6	416	854	133,527	973
	Total Initial	186	21,839	52,316	895,558	5,000
			Second Working			
Illinois	Bureau-State	1	19	116	11,685	40
Indiana	Bureau-State	5	144	399	37	2
Iowa	Bureau-State	4	52	321	26,590	132
Ohio	Bureau-State	21	713	2,072	895	15
Michigan	Bureau-State	20	3,704	7,318	59,483	640
	Forest Service	5	185	500	50,564	255
	Total	25	3,889	7,818	110,047	895
Minnesota	Bureau-State	6	511	553	92,528	713
	Forest Service	8	463	714	41,438	425
	Total	14	974	1,267	133,966	1,138
Wisconsin	Bureau-State	25	3,436	7,566	46,237	634
	Forest Service	2	140	243	20,995	164
	Indian Service	7	852	1,239	18,503	581
	Total	34	4,428	9,048	85,735	1,379
Region	Bureau-State	82	8,579	18,345	237,455	2,176
	Forest Service	15	788	1,457	112,997	844
	Indian Service	7	852	1,239	18,503	581
	Total Second	104	10,219	21,041	368,955	3,601

(Cont'd.)

Table 2. (Cont'd.) Summary of Local Control by States and Operating Agencies, North Central Region, Calendar Year 1953.

State	Operating Agency	Number Areas Worked	Acres White Pine Protected	Acres Worked	Ribes Destroyed	8-Hour Man-Days Used
			Third Working			
Illinois	Bureau-State	3	447	1,557	104,015	292
Indiana	Bureau-State	9	252	1,289	324	7
Iowa	Bureau-State	3	68	240	9,443	89
Ohio	Bureau-State	20	604	1,690	1,101	19
Michigan	Bureau-State	17	4,142	8,307	81,285	827
	Forest Service	20	1,450	3,060	43,835	514
	Total	37	5,592	11,367	125,120	1,341
Minnesota	Bureau-State	3	169	297	10,581	121
	Forest Service	10	1,059	1,386	45,959	555
	Indian Service	20	4,296	5,472	41,639	712
	Total	33	5,524	7,155	98,179	1,388
Wisconsin	Bureau-State	7	1,117	3,150	37,116	346
	Forest Service	10	4,962	8,232	64,455	617
	Indian Service	3	1,344	2,274	24,394	603
	Total	20	7,423	13,656	125,965	1,566
Region	Bureau-State	62	6,799	16,530	243,865	1,701
	Forest Service	40	7,471	12,678	154,249	1,686
	Indian Service	23	5,640	7,746	66,033	1,315
	Total Third	125	19,910	36,954	464,147	4,702
			All Workings			
Illinois	Bureau-State	10	561	2,168	160,148	354
Indiana	Bureau-State	28	573	2,073	1,287	16
Iowa	Bureau-State	9	123	570	38,373	227
Ohio	Bureau-State	89	2,444	6,335	3,001	55
Michigan	Bureau-State	62	9,701	20,687	221,624	2,035
	Forest Service	28	1,831	4,190	105,798	814
	Total	90	11,532	24,877	327,422	2,849
Minnesota	Bureau-State	17	786	1,409	122,282	1,011
	Forest Service	37	2,524	3,625	195,315	1,714
	Indian Service	22	4,432	5,704	120,888	1,040
	Total	76	7,742	10,738	438,485	3,765
Wisconsin	Bureau-State	75	19,988	48,286	438,519	2,347
	Forest Service	24	6,529	11,129	224,250	1,861
	Indian Service	14	2,476	4,135	97,175	1,829
	Total	113	28,993	63,550	759,944	6,037
Region	Bureau-State	290	34,176	81,528	985,234	6,045
	Forest Service	89	10,884	18,944	525,363	4,389
	Indian Service	36	6,908	9,839	218,063	2,869
	Total, All	415	51,968	110,311	1,728,660	13,303

Table 3. Summary of Acres of White Pine Protected and Acres Worked
By States, Ownership Classes and Workings
North Central Region, Calendar Year 1953

State	Ownership Class	Initial Working, Acres: White Pine	Initial Working, Acres: Control Area	Second Working, Acres: White Pine	Second Working, Acres: Control Area	Other Workings, Acres: White Pine	Other Workings, Acres: Control Area	All Workings, Acres: White Pine	All Workings, Acres: Control Area
Illinois	Private	31	154	-	-	150	530	181	68[illegible]
	Non-Fed. Public	64	341	19	116	297	1,027	380	1,48[illegible]
	Total	95	495	19	116	447	1,557	561	2,16[illegible]
Indiana	Private	177	385	130	319	230	1,100	537	1,80[illegible]
	Non-Fed. Public	-	-	14	80	22	189	36	26[illegible]
	Total	177	385	144	399	252	1,289	573	2,0[illegible]
Iowa	Private	3	9	6	35	18	55	27	9[illegible]
	Non-Fed. Public	-	-	46	286	50	185	96	47[illegible]
	Total	3	9	52	321	68	240	123	5[illegible]
Ohio	Private	683	1,888	271	704	480	1,240	1,434	3,83[illegible]
	Non-Fed. Public	444	685	442	1,368	124	450	1,010	2,50[illegible]
	Total	1,127	2,573	713	2,072	604	1,690	2,444	6,3[illegible]
Michigan	Private	1,047	2,882	1,429	3,458	3,090	5,872	5,566	12,21[illegible]
	Non-Fed. Public	673	1,695	2,275	3,860	1,052	2,435	4,000	7,9[illegible]
	Forest Service	331	1,115	185	500	1,450	3,060	1,966	4,67[illegible]
	Total	2,051	5,692	3,889	7,818	5,592	11,367	11,532	24,8[illegible]
Minnesota	Private	48	181	2	5	144	257	194	44[illegible]
	Non-Fed. Public	56	378	509	548	25	40	592	96[illegible]
	Forest Service	1,002	1,525	463	714	1,059	1,386	2,524	3,62[illegible]
	Indian Service	136	232	-	-	4,296	5,472	4,432	5,70[illegible]
	Total	1,244	2,316	974	1,267	5,524	7,155	7,742	10,7[illegible]
Wisconsin	Private	1,535	5,673	1,551	4,397	581	2,420	3,667	12,49[illegible]
	Non-Fed. Public	13,900	31,897	1,885	3,169	536	730	16,321	35,7[illegible]
	Forest Service	1,427	2,654	140	243	4,962	8,232	6,529	11,12[illegible]
	Indian Service	280	622	852	1,239	1,344	2,274	2,476	4,1[illegible]
	Total	17,142	40,846	4,428	9,048	7,423	13,656	28,993	63,[illegible]
Region	Private	3,524	11,172	3,389	8,918	4,693	11,474	11,606	31,5[illegible]
	Non-Fed. Public	15,139	34,996	5,190	9,427	2,106	5,056	22,435	49,47[illegible]
	Forest Service	2,760	5,294	788	1,457	7,471	12,678	11,019	19,42[illegible]
	Indian Service	416	854	852	1,239	5,640	7,746	6,908	9,63[illegible]
	Grand Total	21,839	52,316	10,219	21,041	19,910	36,954	51,968	110,3[illegible]

Table 4. Results of Checking After Ribes Eradication by States and Ownership Classes, North Central Region, Calendar Year 1953.

State	Ownership Class	Acres Worked and Checked	Strip Acres	Ribes Found: Bushes	Ribes Found: F.L.S.	Ribes per Acre: Bushes	Ribes per Acre: F.L.S.	Classification of Worked Areas on Basis of Ribes F.L.S. per acre after Eradication: 0.0-15.0 F.L.S. (Acres)	15.1-25.0 F.L.S. (Acres)	Over 25 F.L.S. (Acres)
Illinois	State-Private	2,104	55.0	66	275.9	1.2	5.0	2,104	-	-
Indiana	State-Private	1,842	29.9	23	88.0	0.8	2.9	1,842	-	-
Iowa	State-Private	446	27.0	214	368.0	7.9	13.6	323	123	-
Ohio	State-Private	3,699	57.1	46	251.0	0.8	4.4	3,699	-	-
Michigan	State-Private	19,987	542.9	556	1,584.0	1.0	2.9	19,500	397	90
	Forest Service	4,675	115.3	339	766.7	2.9	6.6	4,565	110	-
	Total	24,662	658.2	895	2,350.7	1.4	3.6	24,065	507	90
Minnesota	State-Private	1,316	60.2	377	686.8	6.3	11.4	1,067	209	40
	Forest Service	3,625	84.5	539	855.3	6.4	10.1	3,235	143	247
	Indian Service	5,704	237.0	298	553.5	1.3	2.3	5,704	-	-
	Total	10,645	381.7	1,214	2,095.6	3.2	5.5	10,006	352	287
Wisconsin	State-Private	44,286	399.7	889	2,327.7	2.2	5.8	44,156	130	-
	Forest Service	10,515	148.7	665	1,035.5	4.5	7.0	9,915	600	-
	Indian Service	2,314	45.5	257	413.0	5.6	9.1	1,724	590	-
	Total	57,115	593.9	1,811	3,776.2	3.0	6.4	55,795	1,320	-
Region	State-Private	73,680	1,171.8	2,171	5,581.4	1.9	4.8	72,691	859	130
	Forest Service	18,815	348.5	1,543	2,657.5	4.4	7.6	17,715	853	247
	Indian Service	8,018	282.5	555	966.5	2.0	3.4	7,428	590	-
	Total	100,513	1,802.8	4,269	9,205.4	2.4	5.1	97,834	2,302	377

Note: There were 110,311 acres covered for ribes in 1953. Of this, 100,513 acres were formally checked, and 9,798 acres not formally checked. Most of this unchecked acreage did not contain enough ribes to justify the cost of a formal check. Some of this unchecked acreage was worked so late in the season that formal checking was postponed until spring of 1954, when missed ribes will be more plainly visible

Table 5. Control Area Permits, North Central Region, Calendar Year 1953.

State	Number of Applications Received	Number of Permits Issued	Number of Applications Rejected	Number of Applications Voluntarily Cancelled	Percent Applications Approved	Approximate Number Man-Days Used
Michigan	96	69	2	25	71.9	4
Minnesota	79	66	0	13	83.5	2
Ohio	19	13	6	0	68.4	1
Wisconsin	201	201	0	0	100.0	4
Total	395	349	8	38	88.4	11

Table 6. Status of Control by States and Districts, North Central Region, on December 31, 1953 - Net Acres

District	Total Acres: White Pine	Total Acres: Control Area	Acres Initially Worked: White Pine	Acres Initially Worked: Control Area	Percent Control Area: Initially Worked	Percent Control Area: On Maintenance	Acres Control Area Requiring: Initial Work	Acres Control Area Requiring: Re-Work	Acres Control Area Requiring: Maintenance Work
				Illinois					
Entire State	2,180	11,477	2,128	11,112	96.8	18.1	365	9,033	2,079
				Indiana					
Entire State	10,747	92,584	9,221	79,484	85.9	72.3	13,100	12,569	66,915
				Iowa					
Entire State	3,129	14,732	1,853	10,778	73.2	16.7	3,954	8,318	2,460
				Ohio					
Entire State	24,134	211,845	18,328	176,402	83.3	48.0	35,443	74,792	101,610
				Michigan					
L. Peninsula	278,476	895,911	252,796	802,062	89.5	42.3	93,849	423,370	378,692
Up. Peninsula	143,487	326,549	128,041	293,441	89.9	50.5	33,108	128,442	164,999
Entire State	421,963	1,222,460	380,837	1,095,503	89.6	44.5	126,957	551,812	543,691
				Minnesota					
St. Paul	12,622	66,041	11,130	55,043	83.3	12.3	10,998	46,889	8,154
Duluth	77,492	159,275	54,245	97,735	61.4	18.9	61,540	67,620	30,115
Walker	117,965	267,761	98,746	215,762	80.6	30.9	51,999	132,963	82,799
Entire State	208,079	493,077	164,121	368,540	74.7	24.6	124,537	247,472	121,068
				Wisconsin					
Eastern	203,979	666,554	184,303	587,726	88.2	43.4	78,828	298,327	289,399
Western	308,294	925,799	276,008	778,334	84.1	45.7	147,465	355,307	423,027
Entire State	512,273	1,592,353	460,311	1,366,060	85.8	44.7	226,293	653,634	712,426
				Region					
Entire Region	1,182,505	3,638,528	1,036,799	3,107,879	85.4	42.6	530,649	1,557,630	1,550,249

Table 7. Status of Control by States and Ownership Classes, North Central Region, On December 31, 1953 - Net Acres

Ownership Class	Total Acres		Acres Initially Worked		Percent Control Area		Acres Control Area Requiring		
	White Pine	Control Area	White Pine	Control Area	Initially Worked	On Maintenance	Initial Work	Re-Work	Maintenance Work
				Illinois					
Private	851	4,784	806	4,533	94.8	12.4	251	3,939	594
Non-Fed. Pub.	1,329	6,693	1,322	6,579	98.3	22.2	114	5,094	1,485
Total	2,180	11,477	2,128	11,112	96.8	18.1	365	9,033	2,079
				Indiana					
Private	7,560	74,196	6,146	61,983	83.5	68.8	12,213	10,970	51,013
Non-Fed. Pub.	3,169	18,209	3,057	17,322	95.1	86.3	887	1,599	15,723
Forest Service	18	179	18	179	100.0	100.0	-	-	179
Total	10,747	92,584	9,221	79,484	85.9	72.3	13,100	12,569	66,915
				Iowa					
Private	2,490	10,554	1,215	6,664	63.1	19.5	3,890	4,609	2,055
Non-Fed. Pub.	589	3,678	588	3,614	98.3	5.4	64	3,415	199
Indian Service	50	500	50	500	100.0	41.2	-	294	206
Total	3,129	14,732	1,853	10,778	73.2	16.7	3,954	8,318	2,460
				Ohio					
Private	13,775	152,021	11,043	128,024	84.2	50.5	23,997	51,315	76,709
Non-Fed. Pub.	9,844	55,795	6,770	44,349	79.5	37.4	11,446	23,477	20,872
Forest Service	515	4,029	515	4,029	100.0	100.0	-	-	4,029
Total	24,134	211,845	18,328	176,402	83.3	48.0	35,443	74,792	101,610
				Michigan					
Private	221,100	733,279	192,867	636,669	86.8	33.5	96,610	390,756	245,913
Non-Fed. Pub.	133,594	315,681	123,328	290,614	92.1	52.1	25,067	126,135	164,479
Forest Service	67,269	173,500	64,642	168,220	97.0	76.8	5,280	34,921	133,299
Total	421,963	1,222,460	380,837	1,095,503	89.6	44.5	126,957	551,812	543,691

Table 7. (Cont'd.) Status of Control by States and Ownership Classes, North Central Region, On December 31, 1953 - Net Acres

Ownership Class	Total Acres White Pine	Total Acres Control Area	Acres Initially Worked White Pine	Acres Initially Worked Control Area	Percent Control Area Initially Worked	Percent Control Area On Maintenance	Acres Control Area Requiring Initial Work	Acres Control Area Requiring Re-Work	Acres Control Area Requiring Maintenance Work
Minnesota									
Private	89,835	281,800	69,725	211,734	75.1	14.5	70,066	170,908	40,826
Non-Fed. Pub.	56,746	116,029	39,509	76,557	66.0	20.7	39,472	52,516	24,041
Forest Service	40,748	64,421	34,151	49,465	76.8	51.8	14,956	16,095	33,370
Indian Service	20,750	30,827	20,736	30,784	99.9	74.1	43	7,953	22,831
Entire State	208,079	493,077	164,121	368,540	74.7	24.6	124,537	247,472	121,068
Wisconsin									
Private	263,253	1,004,355	219,232	790,376	78.7	39.9	213,979	389,960	400,416
Non-Fed. Pub.	147,013	410,108	145,262	407,742	99.4	46.5	2,366	217,063	190,679
Forest Service	40,775	70,889	36,664	64,673	91.2	64.2	6,216	19,137	45,536
Indian Service	61,232	107,001	59,153	103,269	96.5	70.8	3,732	27,474	75,795
Entire State	512,273	1,592,353	460,311	1,366,060	85.8	44.7	226,293	653,634	712,426
Region									
Private	598,864	2,260,989	501,034	1,839,983	81.4	36.2	421,006	1,022,457	817,526
Non-Fed. Pub.	352,284	926,193	319,836	846,777	91.4	45.1	79,416	429,299	417,478
Forest Service	149,325	313,018	135,990	286,566	91.5	69.1	26,452	70,153	216,413
Indian Service	82,032	138,328	79,939	134,553	97.3	71.4	3,775	35,721	98,832
Entire Region	1,182,505	3,638,528	1,036,799	3,107,879	85.4	42.6	530,649	1,557,630	1,550,249

Table 8. Summary of Ribes Eradication by States and Operating Agencies, Cumulative 1918 to 1953. - Gross Acres

Oper. Agency	First Working: Acres Worked	First Working: Ribes Destroyed	First Working: Man-Days Used	Second Working: Acres Worked	Second Working: Ribes Destroyed	Second Working: Man-Days Used	Third & Other Workings: Acres Worked	Third & Other Workings: Ribes Destroyed	Third & Other Workings: Man-Days Used	All Workings: Acres Worked	All Workings: Ribes Destroyed	All Workings: Man-Days Used
Illinois												
Bur.-St.	21,219	1,577,819	3,945	10,650	629,790	2,583	14,818	677,102	3,996	46,687	2,884,711	10,52[illegible]
Indiana												
Bur.-St.	95,596	476,897	4,068	24,729	103,769	1,127	14,862	35,817	367	135,187	616,483	5,56[illegible]
Iowa												
Bur.-St.	38,980	3,621,789	27,380	8,068	767,830	5,596	2,394	174,485	1,666	49,442	4,564,104	34,64[illegible]
Ind. Ser.	500	13,462	169	500	14,150	144	200	4,155	44	1,200	31,767	35[illegible]
Total	39,480	3,635,251	27,549	8,568	781,980	5,740	2,594	178,640	1,710	50,642	4,595,871	34,99[illegible]
Ohio												
Bur.-St.	217,215	2,586,587	33,148	56,179	727,913	12,494	21,542	189,091	2,603	294,936	3,503,591	48,24[illegible]
Michigan												
Bur.-St.	1,264,901	60,354,273	253,846	414,749	7,412,714	47,660	111,161	1,251,562	11,772	1,790,811	69,018,549	313,27[illegible]
For. Ser.	104,413	5,300,206	28,489	67,409	1,155,869	11,601	46,595	367,284	6,921	218,417	6,823,359	47,01[illegible]
Total	1,369,314	65,654,479	282,335	482,158	8,568,583	59,261	157,756	1,618,846	18,693	2,009,228	75,841,908	360,2[illegible]
Minnesota												
Bur.-St.	326,486	44,677,587	111,731	75,748	4,314,213	22,324	9,101	482,051	3,310	411,335	49,473,851	137,36[illegible]
For. Ser.	72,507	7,451,975	39,732	28,036	1,574,405	14,145	18,799	566,882	8,439	119,342	9,593,262	62,3[illegible]
Ind. Ser.	32,204	10,335,950	19,687	26,851	2,790,035	13,159	27,470	1,900,524	12,933	86,525	15,026,509	[illegible]5,7[illegible]
Total	431,197	62,465,512	171,150	130,635	8,678,653	49,628	55,370	2,949,457	24,682	617,202	74,093,622	24[illegible]
Wisconsin												
Bur.-St.	1,333,096	63,399,251	275,684	390,044	5,337,213	46,870	34,982	657,747	6,246	1,758,122	69,394,211	328,[illegible]
For. Ser.	60,677	5,030,800	32,390	37,427	865,479	10,573	24,413	424,997	6,131	122,517	6,321,276	49,[illegible]
Ind. Ser.	106,526	21,030,521	71,937	56,945	3,860,978	29,054	23,560	1,051,960	11,243	187,031	25,943,459	112,[illegible]
Total	1,500,299	89,460,572	380,011	484,416	10,063,670	86,497	82,955	2,134,704	23,620	2,067,670	[illegible],658,946	490,1[illegible]
Region												
Bur.-St.	3,297,493	176,694,203	709,302	980,167	19,293,442	138,654	208,360	3,467,855	29,960	4,486,520	199,455,500	876,[illegible]
For. Ser.	237,597	17,782,981	100,611	132,872	3,595,753	36,319	89,307	1,359,163	21,491	460,276	22,737,897	158,[illegible]
Ind. Ser.	139,230	31,379,933	91,793	84,296	6,665,163	42,357	51,230	2,956,639	24,220	274,756	41,001,735	158,3[illegible]
Region Total	3,674,320	225,857,117	902,206	1,197,335	29,554,358	217,330	349,897	7,783,657	75,671	5,221,552	263,195,132	1,1[illegible]

Table 9. Summary of Nursery Sanitation Performed during 1953, North Central Region
(All Work by Bureau-State Operating Agency)

Name and Ownership of Nursery	Working	White Pine Trees in Nursery	Acres Protected	Acres Worked	Ribes Destroyed	Man-Days Used
		Iowa				
Fort Atkinson Nursery, Private	Third	10,000	10	45	5,694	22
		Ohio				
Henry Kohankie, Private	Seventh	4,500	45	450	0	2
		Minnesota				
Badoura, State	Eighth	2,000,000	65	335	12,978	87
		Wisconsin				
Boscobel, State	First	2,225,000	130	600	8,167	30
Gordon, State	Tenth	880,000	20	373	95	42
Griffith, State*	Eleventh	7,100,000	22	116	775	69
Hayward, State*	Tenth	2,100,000	80	552	1,896	170
Marathon, County	First	30,000	5	80	6,519	53
Total, Wisconsin		12,335,000	257	1,721	17,452	364
Region Total - 8 Nurseries		14,349,500	377	2,551	36,124	475

*Extensions of Sanitation Zones.

Table 10. Current and Cumulative Cultivated Black Currant Elimination, North Central Region

State	Number of Properties Inspected	Found: Plantings	Found: Plants	Destroyed: Plantings	Destroyed: Plants	Man-Days Used	Plantings Found Per 1,000 Inspections
			Calendar Year 1953				
Michigan	3	3	261	3	261	5	-
			Cumulative to December 31, 1953				
Illinois	48,067	532	4,171	60	761	*	11.1
Indiana	64,226	5	20	3	15	*	0.2
Iowa	318,600	1,612	7,335	1,607	7,314	6,531	5.1
Ohio	1,845,970	8,838	75,605	8,406	73,117	25,791	4.8
Michigan	981,741	15,039	151,407	15,026	151,145	40,295	15.3
Minnesota	211,664	3,261	23,309	3,261	23,309	12,001	15.4
Wisconsin	922,898	6,601	37,080	6,597	37,051	32,137	7.2
Total Region	4,393,166	35,888	298,927	34,960	292,712	116,755	8.2

*Found in connection with other work.

Table 11. Approximate Number of Persons Employed by Months and Agencies, North Central Region, Calendar Year 1953

Operating Agency	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Average Per Month
							Illinois							
State & Private	1.0	1.0	1.1	2.8	1.3	3.3	8.0	2.5	1.0	1.0	1.0	1.0	25.0	2.1
							Indiana							
State & Private	1.0	0.2	-	0.2	-	-	0.2	0.2	0.2	0.2	0.2	0.2	2.6	0.2
Bureau	0.5	0.5	-	0.5	-	-	0.2	0.5	-	-	-	-	2.2	0.2
Total	1.5	0.7	-	0.7	-	-	0.4	0.7	0.2	0.2	0.2	0.2	4.8	0.4
							Iowa							
State & Private	-	-	-	1.0	2.8	1.5	0.5	-	0.1	0.1	-	-	6.0	0.5
Bureau	1.0	1.0	1.0	1.0	1.2	3.2	1.5	0.3	0.8	1.0	1.0	1.0	14.0	1.2
Total	1.0	1.0	1.0	2.0	4.0	4.7	2.0	0.3	0.9	1.1	1.0	1.0	20.0	1.7
							Ohio							
State & Private	0.1	0.2	0.3	0.5	0.4	0.6	0.5	0.2	0.4	0.2	0.2	0.2	3.8	0.3
Bureau	0.5	0.5	1.3	0.8	2.3	1.3	1.3	0.8	1.3	0.3	0.3	0.3	11.0	0.9
Total	0.6	0.7	1.6	1.3	2.7	1.9	1.8	1.0	1.7	0.5	0.5	0.5	14.8	1.2
							Michigan							
State & Private	2.0	2.0	2.0	5.0	11.0	17.0	22.5	18.7	14.0	2.0	2.0	2.0	100.2	8.4
Bureau	2.0	2.0	2.0	2.5	6.0	10.0	6.0	6.0	6.0	2.0	2.0	2.0	48.5	4.0
Forest Service	-	-	-	-	2.4	4.5	9.2	11.3	4.0	-	-	-	31.4	2.6
Total	4.0	4.0	4.0	7.5	19.4	31.5	37.7	36.0	24.0	4.0	4.0	4.0	180.1	15.0
							Minnesota							
State & Private	-	-	-	-	2.7	11.3	13.6	3.7	-	-	-	-	31.3	2.6
Bureau	3.0	3.0	3.4	4.5	4.4	13.1	7.6	4.5	3.0	3.5	4.0	3.5	57.5	4.8
Forest Service	-	-	-	1.0	5.8	26.1	44.2	38.9	11.0	0.3	-	-	127.3	10.6
Indian Service	2.3	-	-	-	14.2	27.7	6.2	5.3	1.7	-	-	-	57.4	4.8
Total	5.3	3.0	3.4	5.5	27.1	78.2	71.6	52.4	15.7	3.8	4.0	3.5	273.5	22.8

Table 11. (Cont'd.) Approximate Number of Persons Employed by Months and Agencies, North Central Region, Calendar Year 1953

Operating Agency	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Average Per Month
						Wisconsin								
State & Private	2.0	2.0	2.0	5.2	7.1	35.0	23.5	19.5	16.7	5.0	2.0	2.0	122.0	10.2
Bureau	3.5	3.5	3.5	4.3	12.1	34.8	12.1	6.5	8.0	4.0	4.0	4.0	100.3	8.3
Forest Service	2.0	0.7	-	2.0	11.9	28.3	31.2	10.3	-	2.0	-	-	88.4	7.4
Indian Service*	-	-	-	1.0	33.0	35.0	21.1	1.0	5.0	-	-	-	96.1	8.0
Total	7.5	6.2	5.5	12.5	64.1	133.1	87.9	37.3	29.7	11.0	6.0	6.0	406.8	33.9
						Project Office								
Bureau	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	38.4	3.2
						Region								
State & Private	6.1	5.4	5.4	14.7	25.3	68.7	68.8	44.8	32.4	8.5	5.4	5.4	290.9	24.3
Bureau	13.7	13.7	14.4	16.8	29.2	65.6	31.9	21.8	22.3	14.0	14.5	14.0	271.9	22.6
Forest Service	2.0	0.7	-	3.0	20.1	58.9	84.6	60.5	15.0	2.3	-	-	247.1	20.6
Indian Service	2.3	-	-	1.0	47.2	62.7	27.3	6.3	6.7	-	-	-	153.5	12.8
Region Total	24.1	19.8	19.8	35.5	121.8	255.9	212.6	133.4	76.4	24.8	19.9	19.4	963.4	80.3

*Includes 11.0 men in May and 12.0 men in June employed on Menominee Indian Tribal funds.

Table 12. Current and Cumulative Summary of Canker Pruning, North Central Region, From Inception to December 31, 1953

State	Number of Areas Treated	Number of Trees Examined	Number of Trees Treated	Number of Trees Removed	Number of Cankers Removed	Man-Days Used
			Calendar Year 1953			
Iowa	10	8,655	211	152	284	9
Michigan	3	6,150	2,911	-	3,408	155
Minnesota	2	53,400	3,003	130	4,062	186
Wisconsin	6	92,572	4,145	928	4,801	145
Total, 1953	21	160,777	10,275	1,210	12,555	495
			Cumulative to December 31, 1953			
Indiana	4	973	8	0	11	1
Iowa	76	60,392	984	908	2,298	72
Ohio	5	1,306	44	13	126	15
Michigan	366	825,356	56,071	520	112,646	3,713
Minnesota	188	526,914	49,550	6,564	84,552	2,275
Wisconsin	15	409,365	26,331	5,354	35,690	573
Region, Cumulative	654	1,824,306	132,988	13,359	235,323	6,649

Table 13. North Central Regional Expenditures, by States and Appropriations, Calendar Year 1953

Appropriation	Illinois	Indiana	Iowa	Ohio	Michigan	Minnesota	Wisconsin	Project Office	Total
State Indirect Aid									
January-June	$ 210.00	$ 300.00	$ 510.00	$ 432.00	$ 675.00	$ 1,400.00	$ 4,960.00	$ -	$ 8,487.0[illegible]
July-December	140.00	300.00	460.00	432.00	675.00	1,300.00	8,440.00	-	11,747.[illegible]
State Direct Aid									
January-June	4,629.52	665.00	966.40	346.00	11,201.36	2,840.55	16,330.93 (a)	-	36,979.7[illegible]
July-December	5,518.59	390.00	127.94	355.00	15,311.65	4,891.31	18,312.30	-	44,906.[illegible]
Sub-Total, State	10,498.11	1,655.00	2,064.34	1,565.00	27,863.01	10,431.86	48,043.23	-	102,120.5[illegible]
Bureau W-a 5									
January-June	-	-	92.50	1,095.66	6,055.91	8,581.45	11,154.19	12,260.37	39,240.[illegible]
July-December	-	-	-	106.67	5,415.75	8,027.00	9,745.49	10,105.58	33,400.[illegible]
Bureau W-e 5									
January-June	155.57	1,959.97	3,036.53	1,518.08	6,882.06	4,590.25	10,788.96	-	28,931.[illegible]
July-December	-	251.00	1,371.72	1,113.35	5,694.96	2,656.96	6,363.01	-	17,451.[illegible]
Forest Service									
January-June	-	-	-	-	1,599.55	17,443.89	9,868.35	-	28,911.[illegible]
July-December	-	-	-	-	7,161.62	23,605.56	10,486.57	-	41,253.[illegible]
Indian Service									
January-June	-	-	-	-	-	8,654.38	10,549.80	-	19,204.18
July-December	-	-	-	-	-	4,283.74	5,460.69	-	9,744.43
Sub-Total, Federal	155.57	2,210.97	4,500.75	3,833.76	32,809.85	77,843.23	74,417.06	22,365.95	218,137.14
All Funds									
January-June	4,995.09	2,924.97	4,605.43	3,391.74	26,413.88	43,510.52	63,652.23	12,260.37	161,754.22
July-December	5,658.59	941.00	1,959.66	2,007.02	34,258.98	44,764.57	58,808.06	10,105.58	158,503.46
Grand Total	$10,653.68	$3,865.97	$6,565.09	$5,398.76	$60,672.86	$88,275.09	$122,460.29	$22,365.95	$320,257.69

(a) Includes $3,556.46 of Menominee Indian Tribal funds.

Table 13 A. North Central Region Expenditures, by State and Activity, Calendar Year 1953

Activity	Illinois	Indiana	Iowa	Ohio	Michigan	Minnesota	Wisconsin	Project Office	Grand Total	Percent Each Activity
Program Planning	$ 600.00	$ 931.00	$ 670.00	$1,401.42	$9,688.21	$7,269.86	$10,173.86	$18,365.95	$49,100.30	15.3
Surveys, Checking	450.00	1,322.00	185.00	1,605.26	6,906.10	9,941.14	4,050.00	-	24,459.50	7.6
Ribes Eradication	7,080.91	976.47	4,413.59	1,725.73	42,728.47	63,242.70	90,401.42	-	210,569.29	65.[illegible]
Nursery Protection	-	-	473.40	178.35	-	1,221.90	4,084.99	-	5,958.64	1.[illegible]
Canker Pruning	-	-	126.10	-	916.08	1,677.45	1,610.02	-	4,329.65	1.[illegible]
Methods Studies	450.00	-	350.00	-	89.00	2,319.57	11,120.00	3,000.00	17,328.57	5.[illegible]
Educational Work	2,072.77	636.50	347.00	488.00	345.00	2,602.47	1,020.00	1,000.00	8,511.74	2.[illegible]
Total	$10,653.68	$3,865.97	$6,565.09	$5,398.76	$60,672.66	$88,275.09	$122,460.29	$22,365.95	$320,257.69	100.0

Table 13 B. North Central Region Expenditures Classified by Sources of Funds and Activities, Calendar Year 1953

Source of Funds	Program Planning	Surveys Checking	Ribes Eradication	Nursery Protection	Canker Pruning	Methods Studies	Educational Work	Total	Percent Each Source of Funds
State Indirect Aid	$ 6,134.00	-	$ 1,766.13	$ 1,213.87	-	$11,120.00	$ -	$ 20,234.00	6.3
State Direct Aid	5,186.31	5,050.87	64,204.92	2,898.17	957.88	795.00	2,793.40	81,866.55	25.6
Bureau W-a	36,477.30	9,659.60	16,877.63	172.07	110.06	4,677.15	4,666.76	72,640.57	22.7
Bureau W-e	1,302.69	5,835.23	35,303.00	1,674.53	456.23	709.16	1,051.58	46,382.42	14.5
Forest Service	-	3,038.78	65,723.48	-	1,376.02	27.26	-	[illegible]	21.9
Indian Service	-	825.02	26,694.13	-	1,429.46	-	-	[illegible]	9.0
Total	$ 49,100.30	$24,459.50	$210,569.29	$ 5,958.64	$4,329.65	$17,328.57	$ 8,511.74	$320,257.69	100.0

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WHITE PINE BLISTER RUST CONTROL

NORTHWESTERN PROJECT

January 1 to December 31, 1953

. . . .

The blister rust control project was transferred to U. S. Forest Service at the end of 1953.

. . . .

United States Department of Agriculture
Agricultural Research Service
Bureau of Entomology and Plant Quarantine
Western Region IV
Blister Rust Control
618 Realty Building
Spokane 1, Washington

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CONTENTS

WHITE PINE BLISTER RUST CONTROL - NORTHWESTERN PROJECT, 1953

Herman E. Swanson, Project Leader
Frank O. Walters, Assistant Project Leader

Problem and Objective

Blister rust control for the Northwestern Project is located primarily in the western white pine type of the Inland Empire, centered in north Idaho and including adjacent portions of eastern Washington and western Montana. Project work extends into Wyoming and Colorado where blister rust control is conducted on selected areas in Yellowstone and Rocky Mountain National Parks. Mount Rainier and Glacier National Parks are also included in the program. Except where otherwise noted, this report deals with the work in the Inland Empire. A separate section of this report covers the work on National Parks.

Experimentation in ribes eradication methods for the control of blister rust in the Inland Empire white pine type was started by the Bureau of Plant Industry with a small crew in 1922. In 1928 cooperative control work was started on state and private lands in Idaho. In 1930 control work was started by the Forest Service in Region One and by the National Park Service in Mount Rainier.

With the advent of large-scale emergency relief work programs on blister rust control in 1933, an optimistic view was taken for the possible protection of a large part of the 3.6 million acres of the commercial white pine type. Additional surveys and appraisals were made and in 1934, 2.7 million acres were selected to constitute the control area. The decrease in the emergency relief programs starting in 1937 and later the drastic curtailment in the control program occasioned by World War II made the protection of the 2.7 million acres an impossible task. Reappraisals of the white pine units were started in earnest in 1943 to establish priorities for portection based on the over-all cost per M of growing white pine.

The present control area in the Inland Empire contains 1,182,000 acres which can be protected with a continuation of the present level of financing through 1969. This acreage now includes definite selections of National Forest white pine units as well as state and private units and represents the basic control area for which work is planned under the present program. There are high value white pine units outside this area which are not being protected but which have been carried in the control area heretofore. While some of these, totaling 217,000 acres, still warrant the cost of blister rust control, the present concept of the control area will permit sounder planning both for blister rust control and timber management. Improvement in control methods may make it possible to add white pine units to this area without increase in control funds. If a decrease in funds is suffered, some areas now supporting mature stands may be dropped without loss of investment in previous control work. The present approach to the blister rust control problem is sufficiently flexible to meet changes in the control program and to insure the selection of white pine units of highest priority.

In addition to the control area acreage in the Inland Empire, 28,840 acres have been selected in four National Parks; Mount Rainier, Glacier, Yellowstone, and Rocky Mountain. Much of the area is now on maintenance requiring only a limited amount of attention to keep ribes suppressed to protection levels.

Values

The potential white pine yield to be protected on the 1,182,000 acres in the commercial white pine area of the Inland Empire is estimated at 23 billion board feet. Costs to date have amounted to $0.73 per M and the estimated future cost to complete the job is $0.97 per M.

Cooperation

The Bureau of Entomology and Plant Quarantine had the responsibility for the leadership, technical direction and over-all coordination of the program as provided in the Appropriation Acts and further described in the memoranda of agreements with the following cooperating agencies:

U. S. Forest Service
National Park Service
State of Idaho
Clearwater Timber Protective Association
Potlatch Timber Protective Association
Priest Lake Timber Protective Association
State of Montana (enforcement of quarantines)
State of Washington (enforcement of quarantines)

Agencies cooperating with the Development and Improvement Project in blister rust control are listed in the report on D & I work.

Status of Program

On the 1,182,000 acres now in the control area, 833,000 acres have received initial working. A total of 618,000 acres is on maintenance or represented in mature stands on which ribes eradication is being deferred until after logging. This figure includes 300,000 acres of immature stands which are on maintenance.

In the area outside the present control area, there are 217,000 acres of mature white pine and largely of state and private ownership representing some of the finest drainages in the region. Logging has already started in some of them. Survival of white pine reproduction will not be possible on these lands without ribes eradication.

Accomplishments in 1953

Accomplishments were slightly greater in 1953 than in 1952 even though the 1953 program was handicapped by forest fires and a reduction in funds. The average accomplishment per man-day on ribes eradication increased 11.8 percent over the 1952 production. Control work was disrupted by fire fighting duty starting in mid-August and many crews did not get back to the blister rust camps to wind up their work satisfactorily. A reduction in funds for the 1954 fiscal year would have necessitated an early closing of some Forest Service camps had it not been for time spent on fires.

Field Program for Ribes Eradication:

Agencies	Camps	Workers
Bureau of Entomology and Plant Quarantine	6	222
(State of Idaho; Clearwater, Potlatch, and Priest Lake Timber Protective Associations as cooperators)		
U. S. Forest Service	32	1,169
National Park Service	5	100
Total	43	1,491

Progress in 1953 on Ribes Eradication:

Agency	Initial Acres	Rework Acres	Total Acres	Total Man-Days	Destroyed Ribes	Per Acre	
						Man-Days	Ribes
Bureau of Entomology & Plant Quarantine	1,350	6,440	7,790	8,070	1,641,900	1.04	211
Forest Service	3,690	37,830	41,520	37,450	1,433,000	.90	35
National Park Service	990	4,530	5,520	3,990	545,000	.72	99
Total	6,030	48,800	54,830	49,510	3,619,000	.90	66

Changes in Operation and Trends

Blister Rust Control and Timber Management Practices. The blister rust control program is being benefited considerably by management practices within the control areas which favor full stocking of white pine and which alleviate the ribes eradication problem. Controlled broadcast burning is recognized and being employed as the best means of ridding the ground of forest litter and valueless residual trees, eliminating existing ribes plants, and greatly reducing stored ribes seed. Also, optimum conditions for planting are brought about by burning. Tests are now under way to find a chemical which when added to 2,4,5-T will prevent sodding by grasses as well as destroy ribes on the burned areas. A treatment producing such results would keep the planting site in good condition until the ribes problem was eliminated. More effort is being made in the cutting of older stands to insure regeneration of white pine by providing for a seed source until protection from blister rust is accomplished. Attention is being given to the relogging of cutover lands to release the white pine reproduction which has become established. Proper timing of such relogging is also considered in order to avoid possible regeneration of ribes.

Chemical Ribes Eradication. The greater average accomplishment per man-day in 1953 was to a great extent caused by the expanded use of chemicals for destroying ribes. Chemical methods constituted 12 percent of the effort in 1953 as compared to 8.9 percent in 1952. Improvement in methods and equipment account for the expanded use. Efficient portable power sprayers which can be back-packed have made more area accessible for power treatment. The 2-cycle high speed engines formerly used were not sufficiently dependable, but the slightly heavier Briggs-Stratton Model 8 engine has proved to be a very satisfactory power plant on the portable power sprayer. Large-scale spraying operations were organized so that water was hauled to the truck-mounted sprayers thereby keeping them in continuous operation. The largest tank used for the water haul had a 1,000-gallon capacity and several sprayers were serviced by the one tank. The number of nozzlemen working from a truck-mounted sprayer was increased to as high as eight.

Summary of Ribes Eradication by Chemical Methods - 1953:

Acres, 4,314; Man-Days, 5,930; Ribes, 2,695,000; Gallons, 751,920

Hand Ribes Eradication. Most areas of low ribes populations can be worked more economically by hand crews. Much thought has been given to raising the production of the individual worker on this type of work. Training procedures and incentives to make the work more interesting have been given careful attention. The development of the one-man dragline method increased the efficiency of the work by fixing responsibility on the individual. In 1953, performance requirements in the form of estimated man-hours required per unit of area were made a part of the one-man system of work. It was successfully applied in some camps. Further refinement in setting and applying the requirements should make the procedure adaptable to all hand ribes eradication work.

Contract Ribes Eradication. Contract ribes eradication remained at about the same level as in 1952. A summary of ribes eradication by contract in 1953 follows:

Contracts, 71; Acres, 3,821; Man-Days, 2,894; Amount Paid, $58,846.

Rust Resistant White Pine. The rust resistant white pine project is now in its fourth year of breeding resistant western white pine and is entering the progeny testing stage. A total of 70 apparently resistant western white pine trees has been found in the Inland Empire, all of which have been vegetatively propagated with approximately 1,000 grafts surviving in the potential seed orchards. Approximately 12,000 western white pine seedlings resulting from 94 different controlled cross pollinations among resistant parent trees have been produced and exposed to blister rust. Time is needed for recognizable cankers to develop, but some indications on resistance should be present in 1954 with important data accumulating by 1956.

Spread of the Rust. Scouting was performed in southern Idaho, eastern Montana, Wyoming, northern Colorado, and northern Utah, but no extension in the known limits of blister rust infection was found.

Recommendations

Additional study on influences causing rust spread and intensification. This study doubtless requires investigation in fields not now familiar to the pathologist, particularly in micro-climate and other meteorological influences. With blister rust being present in the region for at least 30 years, rust behavior, contrary to the normally expected course of development, is being observed in many areas. In some instances where ribes were absent or were reduced to very low numbers over considerable area, the rust has continued to increase while on adjacent areas where conditions appear the same, very little or no rust increase is taking place. In another instance, the rust development was very slow in a drainage over a period of 20 years and in some spots the rust was practically absent even though pine and heavy ribes concentrations are side by side. If the factors determining rust behavior could be recognized and measured ahead of control work, it is possible that substantial savings could be made in control costs through the establishment of ribes standards and protection zones commensurate with the rust hazard.

Control Area Summary

The following summary presents the status of work on the present control area in the Inland Empire:

Ownership	Acres
Federal	914,000
State	88,000
Private	180,000
Total	1,182,000

Estimated Yield: 23,069,000,000 bd. ft.

Estimated 1950-1969 BRC Costs: $21,734,000

Area Worked:

Initial	833,000 Acres
Rework	519,000 Acres

Area on Maintenance:

Immature Stands:	298,000 Acres
Mature Stands:	
Maintenance	68,000 Acres
Working Deferred	251,000 Acres

GENERAL SUMMARIES FOR NORTHWESTERN PROJECT

TABLE 1

SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1953

State	Agency	First Working			Second Working			Other Workings			All Workings			Per Acre	
		Acres	Ribes	Man-Days	Acres	Ribes	Man-Days	Acres	Ribes	Man-Days	Acres	Ribes	Man-Days	Ribes	Man-Days
Idaho	BEPQ	1,350	1,497,800	1,430	1,290	62,800	1,480	5,150	81,300	5,160	7,790	1,641,900	8,070	211	1.04
	FS	2,290	290,300	3,040	14,000	391,700	13,190	15,630	191,000	13,570	31,920	873,000	29,800	27	.93
	Total	3,640	1,738,100	4,470	15,290	454,500	14,670	20,780	272,300	18,730	39,710	2,514,900	37,870	63	.95
Mont.	FS	760	42,000	1,250	2,550	98,000	1,960	1,220	45,000	920	4,530	185,000	4,130	41	.91
	NPS				350	20,000	300	340	12,000	290	690	32,000	590	46	.86
	Total	760	42,000	1,250	2,900	118,000	2,260	1,560	57,000	1,210	5,220	217,000	4,720	42	.90
Wash.	FS	640	251,000	820	2,310	87,000	1,590	2,120	37,000	1,110	5,070	375,000	3,520	74	.69
	NPS							710	27,000	560	710	27,000	560	38	.79
	Total	640	251,000	820	2,310	87,000	1,590	2,830	64,000	1,670	5,780	402,000	4,080	70	.71
Colo.	NPS				1,480	8,000	840	330	9,000	290	1,810	17,000	1,130	9	.62
Wyo.	NPS	990	443,000	1,190	710	21,000	350	610	5,000	170	2,310	469,000	1,710	203	.74
ALL STATES	BEPQ	1,350	1,497,800	1,430	1,290	62,800	1,480	5,150	81,300	5,160	7,790	1,641,900	8,070	211	1.04
	FS	3,690	583,300	5,110	18,860	576,700	16,740	18,970	273,000	15,600	41,520	1,433,000	37,450	35	.90
	NPS	990	443,000	1,190	2,540	49,000	1,490	1,990	53,000	1,310	5,520	545,000	3,990	99	.72
	Total	6,030	2,524,100	7,730	22,690	688,500	19,710	26,110	407,300	22,070	54,830	3,619,900	49,510	66	.90

TABLE 2

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1953

State	Federal Funds					Cooperative Funds			Total All Funds
	Entomology and Plant Quarantine		Forest Service	Park Service	Total Federal Funds	Direct Aid	Indirect Aid	Total	
	W-a.W	W-e.W							
Idaho	$ 75,914	$103,098	$ 820,004		$ 999,016	$54,169	$2,000	$56,169	$1,055,185
Montana	15,200		138,467	$18,100	171,767		1,000	1,000	172,767
Washington	14,025		103,500	11,132	128,657		1,000	1,000	129,657
Colorado	4,125			24,236	28,361				28,361
Wyoming	4,125			42,103	46,228				46,228
Total	$113,389	$103,098	$1,061,971	$95,571	$1,374,029	$54,169	$4,000	$58,169	$1,432,198

TABLE 3

STATUS OF RIBES ERADICATION BY LAND OWNERSHIP

Ownership	Control Area Acres	First Working Acres	Second Working Acres	Other Workings Acres	Maintenance Status Acres
National Forest	904,460	623,530	249,960	103,380	262,720
Public Domain	10,000	10,000	6,030	2,160	4,420
National Parks	28,840	26,720	15,650	19,000	19,950
Subtotal Federal	943,300	660,250	271,640	124,540	287,090
Idaho S-P	257,370	191,350	102,560	52,500	91,620
Montana S-P	6,000	4,000	1,000		4,000
Washington S-P	3,660	3,280	940	80	1,260
Subtotal State-Private	267,030	198,630	104,500	52,580	96,880
Totals	1,210,330	858,880	376,140	177,120	383,970

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS, 1953

Cooperative blister rust control work on state and private lands is confined to the State of Idaho where the state and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations are annually contributing funds directly to the U. S. Treasury to be used in conjunction with federal funds on the program. This program is directed to the protection of selected white pine units of predominately state and private ownership amounting to 195,000 acres. Federal lands in this control area total 28,000 acres.

The original estimates based on a continuance of present level of financing for the period 1950-1969 contemplated the protection of white pine on 188,000 acres. With improved methods, the work has progressed more rapidly than estimated making it possible to increase the size of the control area. The Washington Creek unit in the Clearwater Timber Protective Association was added to the control area. This addition together with adjustment of unit boundaries in other parts of the program brought the control area to 195,000 acres.

Ribes have been suppressed to protection standards on 63,000 acres of young growth. While considerable infection took place before control was established, many extensive areas of healthy white pine are now emerging. Additional healthy white pine reproduction is becoming established in the younger open stands. In some of the more recently logged areas, timely chemical treatment of ribes has prevented the heavy initial blast of infection from the heavy crop of ribes that normally follows the logging disturbance.

The attention given to cutting practices by the state and timber operators in order to favor white pine and minimize the ribes problem is of material benefit to the control program. Frequent contacts between the blister rust control supervisors and the foresters of the state and private companies are made to coordinate management plans with the blister rust control plan for an area.

The Clearwater, St. Joe, and Kaniksu Areas' reports present more detail on the cooperative control program in these particular areas. The following tabulations are condensed summaries of these area reports:

1. Allotments:

Agency	Fiscal Year 1953	*Fiscal Year 1954
Federal (EPQ)	$110,556.82	$ 99,200.00
State of Idaho	30,000.00	35,000.00
Clearwater T.P.A.	10,395.12	10,395.00
Potlatch T.P.A.	8,317.89	8,318.00
Priest Lake T.P.A.	6,292.03	6,292.00
Total	$165,561.89	$159,205.00

*Estimated

2. Cooperative Field Program in Idaho - 1953

Area	Camps	Workers	Contracts	Total Expenditures
Clearwater	3	97	8	$ 65,439
Potlatch	2	100		70,278
Priest Lake	1	25	5	21,550
Total	6	222	13	$157,267

3. Ribes Eradication - Cooperative Program - 1953

Area	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Clearwater	330	2,940	3,270	3,330	125,300	1.02	38
Potlatch	1,020	2,500	3,520	3,690	1,478,600	1.05	420
Priest Lake		1,000	1,000	1,050	38,000	1.05	38
Total	1,350	6,440	7,790	8,070	1,641,900	1.04	211

4. Summary of Expenditures from State and Private Funds in Idaho

Calendar Years	State	Private and T.P. Assns.	Total
1928-1949	$263,498.81	$215,222.91	$478,721.72
1950	24,141.65	16,246.66	40,388.31
1951	21,990.11	16,314.28	38,304.39
1952	33,425.93	19,810.92	53,236.85
1953	29,163.94	25,005.04	54,168.98
Total	$372,220.44	$292,599.81	$664,820.25

5. Status on Units in State and Private Ownership being Protected under Present BRC Program

Ownership:	
Private	102,000 Acres
State	65,000 Acres
Federal	28,000 Acres
Total	195,000 Acres
Estimated Yield:	4,025,000,000 bd. ft.
Estimated 1950-1969 BRC Costs:	$3,261,000
Area Worked:	
Initial	157,000 Acres
Rework	125,000 Acres
Area on Maintenance:	
Immature Stands	63,000 Acres
Mature Stands	
On Maintenance	14,000 Acres
Deferred Working	14,000 Acres

BLISTER RUST CONTROL ON NATIONAL PARKS, 1953
(Mount Rainier, Glacier, Yellowstone, Rocky Mountain)

Ribes eradication in the blister rust control program on the four national parks in this project is progressing very satisfactorily and somewhat ahead of schedule. The 1953 work was handicapped in some cases where snow remained late on control areas and where fire fighting duty interfered with the orderly performance of control work. These set backs were more than compensated for by the excellent progress in other sectors of the program.

Two factors seem quite important in this favorable progress. Chemical eradication methods are not only making initial work more effective by reducing the rework problem but are also proving useful in parts of the rework program. Two efficient portable power sprayers were employed to advantage in Yellowstone in 1953 and these units will be a material aid in completing initial work in the Mount Washburn Extension area. During the past two seasons, a six-man camp in which the men provide their own subsistence has produced considerable economies in working the high and remote portions of the control area in Rocky Mountain. The principal savings come in the elimination of excessive travel time to and from the work areas and in the reduction in costs of establishing and maintaining a government subsisted camp. It is planned to use "batching" camps of this type in other parks for work in remote areas.

The annual blister rust control needs on the 28,840-acre control area are decreasing each year. Only 2,120 acres remain to receive initial working, 6,770 acres require varying degrees of rework, while 19,950 acres are on maintenance. Little future work should be required on the maintenance area except where viable ribes seed may be released from a natural storage environment by a ground disturbance.

Scouting for the spread of the rust failed to find any new blister rust infection centers which would change the hazard picture in the vicinity of Yellowstone and Rocky Mountain.

The work has progressed to the point where the annual control needs over the next 5 years can be estimated quite accurately. The separate reports for each national park contain these estimates.

A summary of expenditures and progress of control work follows:

1. Expenditures by National Park Service

National Park	Calendar Year 1953	All Years
Mount Rainier	$11,132	$180,702
Glacier	18,100	191,036
Yellowstone	42,103	248,276
Rocky Mountain	24,236	124,586
Total	$95,571	$744,600

2. Field Organization in 1953

National Park	Camps	Workers
Mount Rainier	1	16
Glacier	1	17
Yellowstone	2	43
Rocky Mountain	1	24
Total	5	100

3. Ribes Eradication in 1953

National Park	First Working Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Mount Rainier		710	710	560	27,000	.79	38
Glacier		690	690	590	32,000	.86	46
Yellowstone	990	1,320	2,310	1,710	469,000	.74	203
Rocky Mountain		1,810	1,810	1,130	17,000	.62	9
Total	990	4,530	5,520	3,990	545,000	.72	99

4. Status on Present Control Area - All Years

National Park	Control Area Acres	First Working Acres	Rework Acres	Maintenance Acres	Unworked Acres
Mount Rainier	4,500	4,500	16,840	3,580	
Glacier	5,140	5,140	8,790	3,560	
Yellowstone	13,100	10,980	5,480	7,810	2,120
Rocky Mountain	6,100	6,100	3,540	5,000	
Total	28,840	26,720	34,650	19,950	2,120

Blister rust control exhibit, Two Medicine Lake, Glacier National Park. BRC exhibits also at Mount Rainier and Yellowstone.

BLISTER RUST CONTROL ON NATIONAL FORESTS, 1953

Blister rust control operations on National Forests in 1953 started with a slightly larger field force than in 1952. A reduction in field allotments for fiscal year 1954 necessitated a curtailment in work during the last part of the season. The demand for blister rust crews for fire fighting came early in August which made it unnecessary to terminate the services of the seasonal workers before the normal time. Interruptions from fire duty prevented an orderly completion of ribes eradication on the work areas.

Timber management is following practices on timber sale areas which minimize or delay the ribes eradication job. Several broadcast burned areas have been left in excellent shape for rapid chemical treatment of remaining ribes. K-V funds have been collected and are being used to eliminate ribes at the proper time following logging to prevent the dropping of new ribes seed and build-up of blister rust infection.

The unit analyses have been completed for sometime and priority position established for inclusion of units in the blister rust control program. On the basis of the present level of blister rust control operations, a selection was made of those units which could be protected in the work period 1950-1969. These units have been established as the present control area. This control area is not fixed and can be modified from time to time as conditions may warrant. Very little change except for possible additions should be necessary in units of predominately young white pine stands. Considerable investment in ribes eradication has already been made in protecting these young stands within the present control area. It is recognized that management plans for mature units on which the blister rust control problem may not develop for many years may necessitate changes in the units to be given protection from blister rust.

The present control area in units of predominately national forest lands totals 987,000 acres, with an estimated potential yield of 19 billion board feet of white pine. The 1950-1969 blister rust costs are estimated at $18,742,000.

The expenditures and progress in blister rust control on national forest units are summarized below.

1. Expenditures

	Calendar Year 1953			
Forest	Regular	K-V	Total Funds	All Years
Clearwater	$ 107,543	$ 6,880	$ 114,423	$ 2,492,520
St. Joe	339,770		339,770	4,478,612
Coeur d'Alene	150,190	14,765	164,955	2,999,538
Kaniksu	300,766	3,590	304,356	3,075,328
Cabinet	86,211		86,211	1,258,945
Kootenai	52,256		52,256	751,971
Total	$1,036,736	$25,235	$1,061,971	$15,056,914

2. Field Program - 1953

Forest	Camps	Workers	Contracts
Clearwater	3	89	
St. Joe	9	500	6
Coeur d'Alene	6	160	25
Kaniksu	8	285	27
Cabinet	3	85	
Kootenai	3	50	—
Total	32	1,169	58

3. Ribes Eradication by Forest Service Crews - 1953

Forest	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Clearwater	810	1,720	2,530	2,860	264,700	1.13	105
St. Joe	240	13,860	14,100	15,300	301,700	1.09	21
Coeur d'Alene	480	3,870	4,350	4,810	133,600	1.11	31
Kaniksu	1,400	14,610	16,010	10,350	548,000	.65	34
Cabinet	760	1,310	2,070	2,440	95,000	1.18	46
Kootenai		2,460	2,460	1,690	90,000	.69	37
Total	3,690	37,830	41,520	37,450	1,433,000	.90	35

4. Status of Work on National Forest Units in Present BRC Program

Ownership:

Federal	887,000 Acres
State	22,000 Acres
Private	78,000 Acres
Total	987,000 Acres

Estimated Yield: 19,043,867,000 bd. ft.

Estimated 1950-1969 Costs: $18,472,000

Area Worked:

Initial	676,000 Acres
Rework	395,000 Acres

Area on Maintenance:

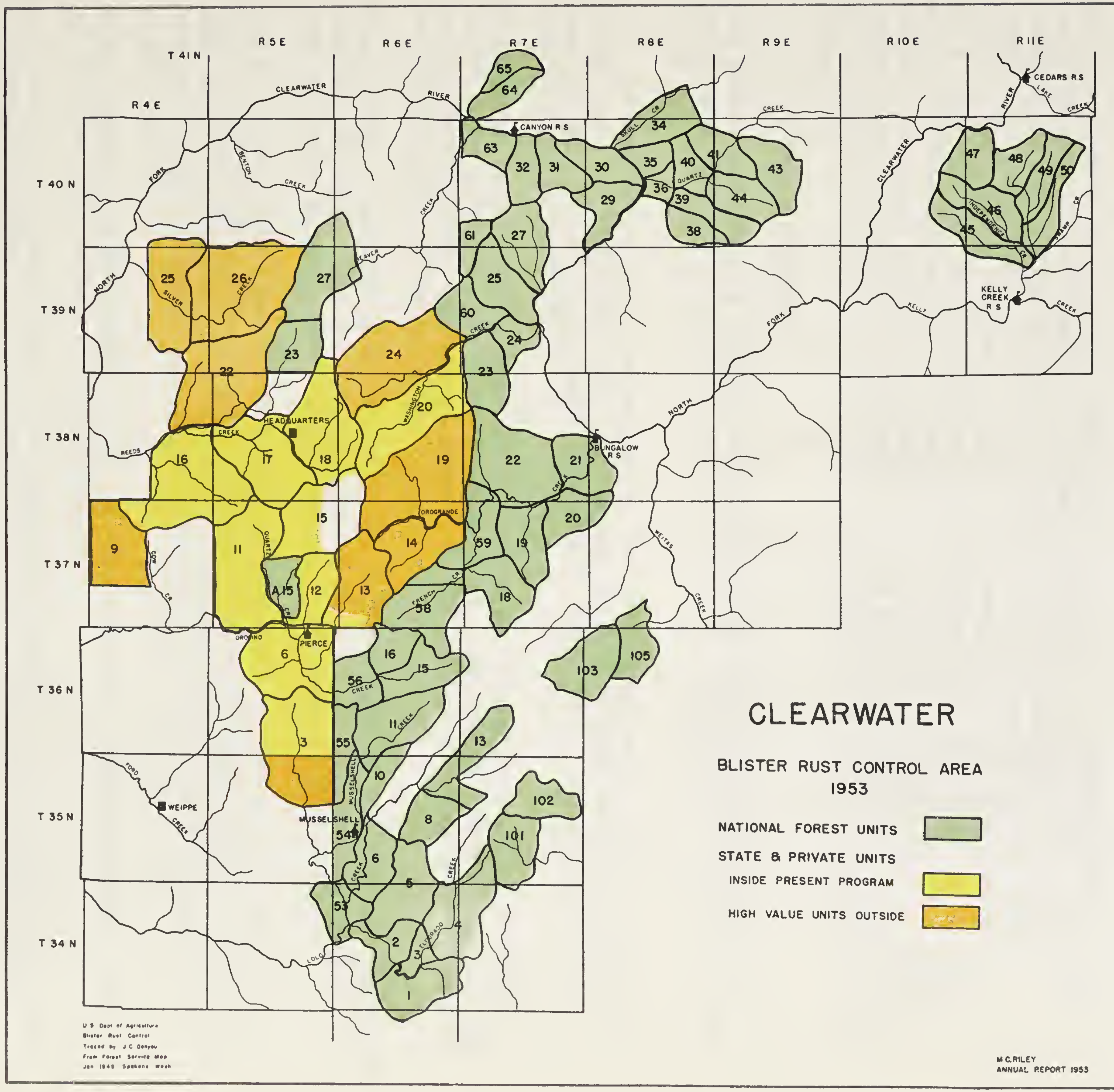
Immature Stands	236,000 Acres
Mature Stands	
On Maintenance	55,000 Acres
Deferred Working	237,000 Acres

SCOUTING FOR WHITE PINE BLISTER RUST IN 1953
J. C. Gynn and C. M. Chapman

Scouting for white pine blister rust in southern Idaho, eastern Montana, Wyoming, Colorado, and Utah revealed no new infection centers and to date the rust has not been found in Colorado or Utah. Pinon rust (Cronartium occidentale) was found on Ribes aureum at seven new locations as indicated below. These centers indicate conditions which are also favorable for white pine blister rust (Cronartium ribicola).

Forest Unit	Drainages Scouted	Ribes Examined	Pines Examined
Lewis & Clark N.F., Montana	4	295	597
Gallatin N.F., Montana	2	130	120
Yellowstone N.P., Wyoming	4	125	480
Shoshone N.F., Wyoming	1	18	30
Washaki N.F., Wyoming	2	300	355
Teton N.F., Wyoming	2	25	180
Bighorn N.F., Wyoming	2	35	184
Medicine Bow N.F., Wyoming	1	42	38
Grand Teton N.P., Wyoming	2	50	75
*Minidoka N.F., Idaho	1	10	
Sawtooth N.F., Idaho	2	170	
Challis N.F., Idaho	2	455	575
Rocky Mountain N.P., Colorado	7	1,655	747
Roosevelt N.F., Colorado	5	715	408
Arapho N.F., Colorado	1	67	
*Routt N.F., Colorado	2	38	
*Dinosaur N.M., Utah	2	20	
*Ashley N.F., Utah	1	10	
**Wasatch N.F., Utah	2	22	
*Cache N.F., Utah	1	31	
Total	46	4,213	3,789

*Pinon rust found.
**Pinon rust found in two locations.


CLEARWATER
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
STATE & PRIVATE UNITS
INSIDE PRESENT PROGRAM
HIGH VALUE UNITS OUTSIDE
R 4 E
R 5 E
R 6 E
R 7 E
R 8 E
R 9 E
R 10 E
R 11 E
T 41 N
T 40 N
T 39 N
T 38 N
T 37 N
T 36 N
T 35 N
T 34 N
CEDARS R S
CANYON R S
KELLY CREEK R S
BUNGALOW R S
HEADQUARTERS
PIERCE
WEIPPE
MUSSELSHELL
OROFINO
U S Dept of Agriculture
Blister Rust Control
Traced by J C Donyou
From Forest Service Map
Jan 1949 Spokane Wash
M C RILEY
ANNUAL REPORT 1953

BLISTER RUST CONTROL, CLEARWATER AREA, 1953
M. C. Riley, Area Leader
D. F. Williams, Assistant Area Leader

I. INTRODUCTION

The Area Leader assumed full responsibility for all ribes eradication training, standards of efficiency, individual performance requirements, and ribes eradication field work on National Forest lands in addition to over-all responsibility for all phases of the work on Clearwater Timber Protective Association lands. This arrangement was occasioned by the assignment of D. J. Moore, U. S. Forest Service, to the spruce bark beetle program. The Assistant Area Leader was in charge of all checking, surveys, and the Bureau ribes eradication contract program; J. P. Bushfield, District Leader, supervised ribes eradication on Clearwater Timber Protective Association lands; and R. F. Weholt, Checker Foreman, supervised checking and survey work on National Forest land.

II. 1953 FIELD PROGRAM

The Bureau cooperative program was conducted on six of the best white pine units from camps located at Blister Rust Control Headquarters, Jaype, and Deer Creek.

All work was completed as scheduled in the following units: Unit 3, Brown's Creek; Unit 6, Hildebrand; Unit 11, Japye; Unit 15, Trail Creek; and Unit 18, Deer Creek. In addition, rework was nearly completed on the North Fork of Reed's Creek in Unit 18.

The Forest Service ribes eradication program was conducted in high priority units. One camp was located on Rosebud Creek, one near Mud Creek Lookout, and one on French Creek. The establishment of the latter two camps was delayed by the late spring and muddy roads.

The Rosebud Creek crew worked in Unit 56, Armstrong; Unit 15, Orofino Creek; and Unit 16, Rosebud. K-V funds were expended in Unit 16. All ground worked had been recently logged. Most of the roadsides had been sprayed in 1952.

The Mud Creek crew started ribes eradication in white pine pole stands in Unit 1, Fan Creek. This work progressed from the southwest corner of the unit east along the road and north toward Eldorado Creek. The roadside on the south boundary supported many large Ribes viscosissimum which were sprayed using power equipment.

Ribes removal was continued in Unit 58, French Creek, adjacent to 1952 work in the excellent white pine pole stand.

All stabilized areas covered this season were placed on maintenance. On ground too recently logged for this classification, the standards were met except where ribes seedlings were present.

Weather and labor contributed to a good season, but fire caused some disruption. Forest Service crews were called on fire duty early in August. Only enough men returned to complete roadside spraying and dismantle the camps. All Bureau crews spent from 5 to 10 days on fire suppression.

1. Expenditures - Calendar Year 1953

Bureau of Entomology and Plant Quarantine		
Leadership and Technical Direction	$ 15,319	
Blister Rust Control on State and Private Lands	42,379	$ 57,698
U. S. Forest Service		
Blister Rust Control on National Forests	107,543	
K-V Funds	6,880	114,423
State of Idaho		12,665
Clearwater Timber Protective Association		10,395
Total Expenditures		$195,181

2. Organization

Agency	Camps	Employees	Contracts
BEPQ - Cooperative	3	89	8
U. S. Forest Service	3	97	

3. Progress on Ribes Eradication - 1953

Agency	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
BEPQ Cooperative	330	2,940	3,270	3,330	125,300	1.02	38
U. S. Forest Service	810	1,720	2,530	2,860	264,700	1.13	105
Totals	1,140	4,660	5,800	6,190	390,000	1.07	67

4. Chemical Ribes Eradication

Chemical work again played a major roll in the 1953 program. Power spraying was primarily used, but Hi-Fog guns, knapsack sprayers, and decapitation were employed where feasible. Crews made every effort toward the integration of hand and chemical methods. The spray program in Bureau camps was conducted primarily along Orofino Creek in an area recently logged. A 1,000-gallon water tank mounted on a 6x6 truck was used to supply the sprayer. This aided materially in permitting the unit to operate practically full time. The Forest Service spray program played an important part in the accomplishments of the 1953 program. One power spray unit was used on roadsides and stream type in the Rosebud camp area and on roadside spraying along the Mud Creek Lookout road. In French Creek three portable power units with four nozzles per sprayer were used all season to good advantage in stream type. The following table shows data for chemical eradication:

Agency	Acres	Man-Days	Ribes	Gallons
BEPQ Cooperative	185	256	84,200	51,600
U. S. Forest Service	349	454	153,900	56,880
Totals	534	710	238,100	108,480

W-1488
Orofino Creek, Unit 6, CTPA, Near Pierce, Idaho. Logged in 1942.

W-1314
Jaype Unit 11, CTPA, near Tree Farm sign. Logged in 1930. Present stocking on areas sufficient to produce full crop. Infection less than 15 percent. Areas meet maintenance standards and are representative of those worked by Bureau crews.

5. Contract Ribes Eradication

This portion of the program on Clearwater Timber Protective Association lands continued on a slightly reduced scale. Only two experienced contractors returned. New contractors bid only on small areas. Contractors worked approximately 14 percent of the area covered on Association lands. The average bid price per acre was slightly higher than last season. No bids were received on an area the Forest Service advertised for contracting. Data on 1953 contracts are as follows:

Agency	No. Contracts	Acres	Man-Days	Ribes	Amount Paid
BEPQ-Cooperative	8	451	474	6,597	$5,630.50

6. Checking and Surveys

A lot check was completed on all ground covered by regular crews. Sprayed areas were not checked during the current season. The checker-flanker method was used on the 451 acres of Bureau contract eradication.

An advance survey was made on the western portion of Unit 20, Washington Creek. Bureau checkers spent 90 man-days in examining 3,600 acres of the unit. Data collected will aid in determining the type of coverage when initiating ribes eradication work in 1954. A specific chemical treatment will be designated for each parcel of the area. Two other small pieces which were cut over in 1949 were advance-surveyed. In Brown's Creek, Unit 3, the survey showed that in the 155 acres examined, the working of roadsides would give adequate protection. These ribes were eradicated during the season. Examination of 80 acres in Canal Gulch, Unit 12, indicated that roadsides and stream type would need future attention.

The post check load on present program units was reduced appreciably when Bureau checkers devoted 106 man-days to this work. Results are shown below:

No.	Unit	Acres Post Checked	Acres Needing Rework
6	Hildebrand	1,790	590
11	Jaype	790	390
3	Brown's Creek	55	55
	Total	2,635	1,035

Of the area shown as needing rework, 215 acres were completed this year.

Approximately 39 percent of the area given a post check needed rework. The remainder meets maintenance standards except in Brown's Creek and portions of the Hildebrand Unit which were logged too recently to be placed in that category. The areas needing rework will be given attention in 1954.

An extensive post check program was started early in August by Forest Service checkers, but little was accomplished because of fire duty.

7. Individual Performance Requirements

Performance requirements were established for each area where the hand eradication method was used. They resulted in increased production and efficiency. On the basis of ribes populations, ground cover, terrain, and any past records available, a reasonable requirement of man-hours per lot was established. Daily production records kept for each worker showed his progress in relation to requirements. Difficulties were encountered in learning to use these requirements effectively. Rates established must be fair with a recognition of variations in individual lots. Definite periods of accountability should be used with prompt and consistent follow-through in appraising each worker.

III. CONTROL STATUS

STATE AND PRIVATE UNITS

Progress of the work on Clearwater Timber Protective Association units in the present program is on schedule. Approximately 60 percent of the area where control work has been done now meets maintenance requirements. Ribes eradication has been properly timed to prevent new ribes from producing seeds on recently logged ground. The status of older logging areas is such that future work can be completed by crews from adjacent units.

Progress has been so satisfactory in these units that operations are being expanded to include Unit 20, Washington Creek. No work has been done in this unit since logging. An excellent stand of white pine reproduction is already established. On most of the area an adequate seed source remains. Plans are to start a power spraying program in 1954 using at least three power outfits. In succeeding years a combination of hand and chemical eradication methods will be used. A comparatively high percentage of the land in this unit is owned by the State of Idaho.

An advanced phase of timber management in the Clearwater Timber Protective Association was initiated when PFI started relogging. Areas thus treated were originally selectively cut and are restocked with good white pine reproduction. Relogging took place at the head of Brown's Creek in Unit 3, originally cut in 1945-46; in Mutton Gulch in Unit 6, originally cut in 1942-43; and in the vicinity of the Tree Farm sign in Unit 11 where first logging occurred in 1930-31. Sufficient seed trees are being left in the proper locations to restock the roads and skid trails.

In Brown's Creek, the relogging was principally on ground which supported very few ribes. No appreciable ribes germination is expected. The Mutton Gulch area was heavily cut originally and has been subjected to several subsequent disturbances. It is not yet possible to appraise the effects of relogging here, but very little ribes germination is expected. In Unit 11, there may be some portions where heavy overwood was removed which will require further working. Since these are small blocks, it is planned that all rework be done by camps in adjacent units.

W-1485, W-1487

Pole stands typical of those worked by Forest Service crews in Unit 1, Fan Creek (top), and Unit 58, French Creek (bottom). Areas placed on maintenance as a result of 1953 work.

W-1156, W-1177

Areas relogged in 1953, Brown's Creek, Unit 3, CTPA. First logged in 1945. Excellent white pine reproduction present. Ribes reduced to maintenance standards prior to relogging. Logs skidded by jammer.

Sufficient time has not elapsed to fully appraise all effects of relogging. There was very little apparent damage to white pine reproduction. Ground disturbances seemed more severe where horse skidding was employed since many logs were skidded to landings over the same trail. In jammer skidding, the logs were decked all along the roads and very few trails were made.

1. State and private units being protected under the present BRC program

Ownership:	
Federal	3,380 Acres
State	15,440 Acres
Private	51,140 Acres
Total	69,960 Acres
Estimated Yield:	1,959,929 MBF
Estimated 1950-1970 BRC Costs:	$1,384,020
Area Worked:	
Initial	50,200 Acres
Rework	37,290 Acres
Area on Maintenance:	
Immature Stands	7,670 Acres
Mature Stands	
On Maintenance	12,930 Acres
Deferred Working	5,280 Acres

2. State and private units not being protected under the present BRC program

Ownership:	
Federal	3,500 Acres
State	29,810 Acres
Private	43,650 Acres
Total	76,960 Acres
Estimated Yield:	2,420,900 MBF
Estimated 1950-1970 BRC Costs:	$2,338,300
Area Worked:	
Initial	43,910 Acres
Rework	7,860 Acres
Area on Maintenance:	
Immature Stands	60 Acres
Mature Stands	
On Maintenance	9,740 Acres
Deferred Working	35,140 Acres

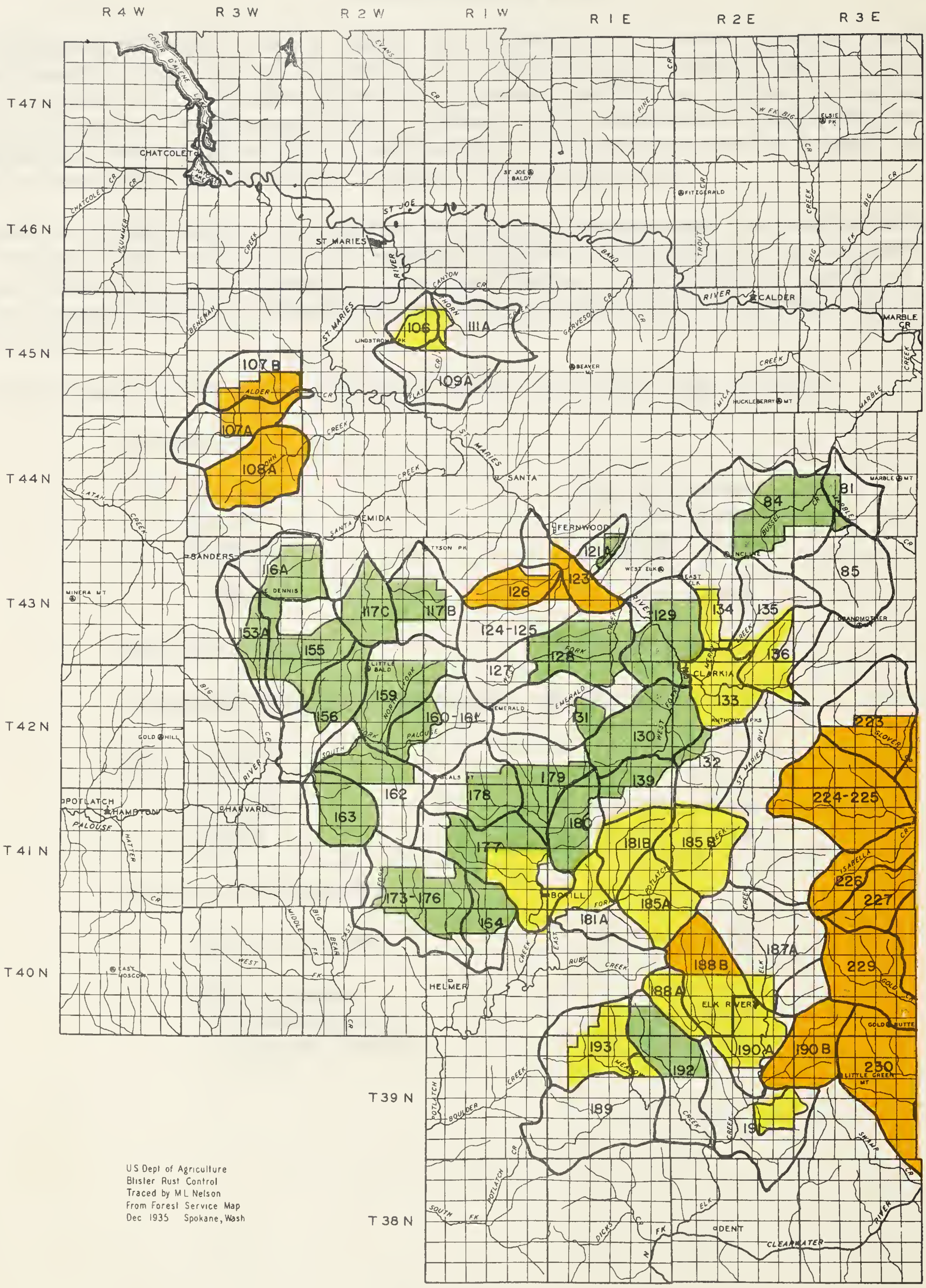
NATIONAL FOREST UNITS

On Clearwater National Forest lands, the blister rust control program continues toward meeting the primary objectives of maintaining a steady flow of white pine products to local operators and to protect sufficient white pine growing stock to insure a continuous yield. Recent ribes eradication has resulted in placing all stabilized areas on maintenance. On ground recently logged, maintenance standards are being met except in seedling areas.

Because of higher wages, an accelerated cutting program,and reduced allotments for blister rust control, it is becoming increasingly difficult to achieve proper timing for all necessary ribes eradication. Appraisal of units in the current program for the Clearwater National Forest will be necessary in the near future.

National Forest units being protected under the present BRC program

Ownership:	
Federal	192,980 Acres
State	3,870 Acres
Private	17,480 Acres
Total	214,330 Acres
Estimated Yield:	5,740,809 MBF
Estimated 1950-1970 BRC Costs:	$4,343,400
Area Worked:	
Initial	113,080 Acres
Rework	59,690 Acres
Area on Maintenance:	
Immature Stands	16,120 Acres
Mature Stands	
On Maintenance	18,780 Acres
Deferred Working	103,340 Acres



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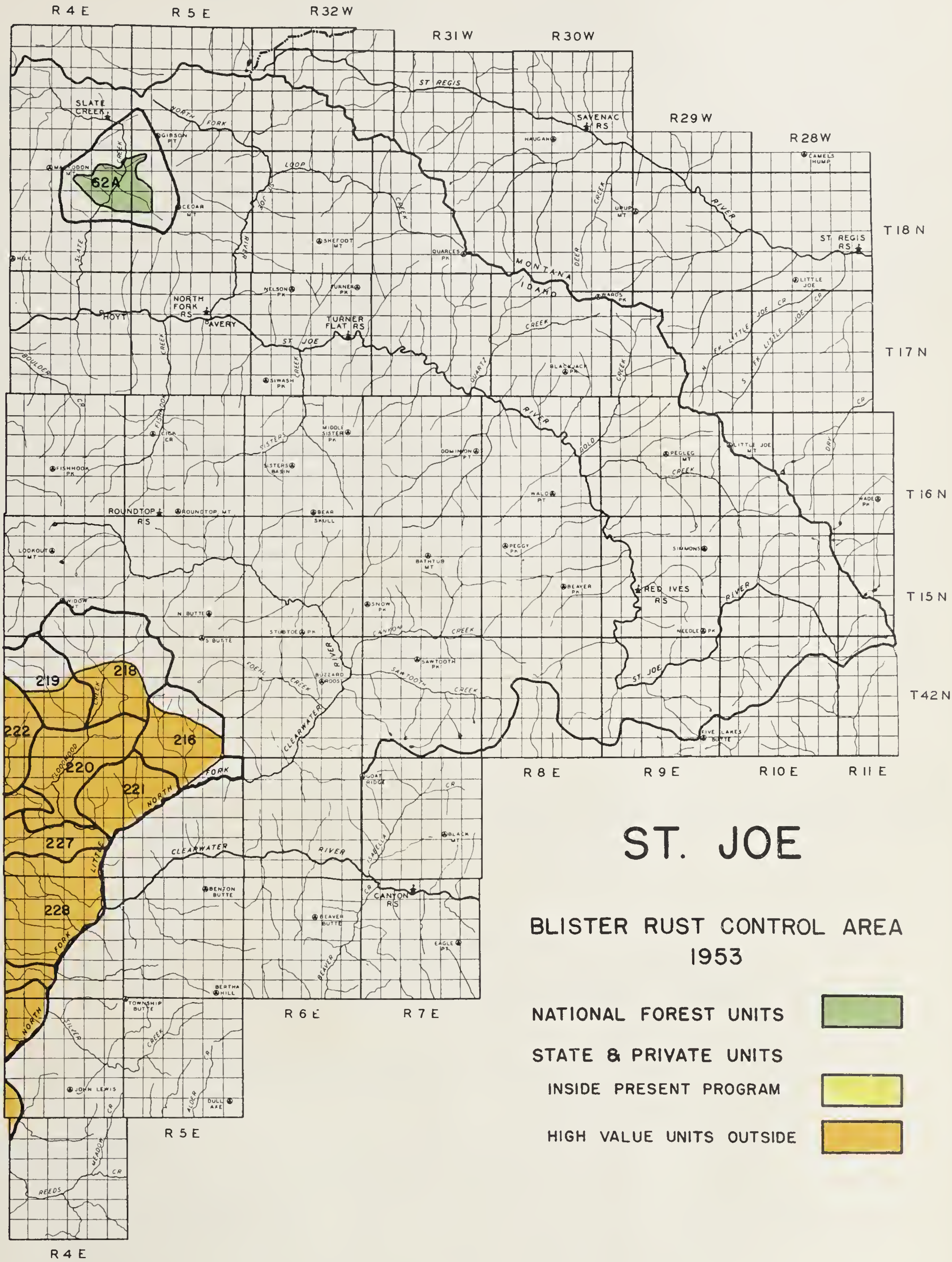

ST. JOE
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
STATE & PRIVATE UNITS
INSIDE PRESENT PROGRAM
HIGH VALUE UNITS OUTSIDE

BLISTER RUST CONTROL, ST. JOE AREA, 1953

H. J. Hartman, Area Leader
W. F. Painter, Assistant Area Leader

I. INTRODUCTION

Blister rust control was continued on lands of the St. Joe National Forest and Potlatch Timber Protective Association for the 25th consecutive year. The paramount objective is to protect the maximum future volume of white pine with the minimum expenditure. Funds are far short of actual needs for a complete control program. Only 25 percent of the white pine acreage of the National Forest and Association is included in the present control program. Nearly all unprotected immature stands of the area are dead or dying from blister rust. Due to the extended period of time required for blister rust to damage mature white pine stands, control work was discontinued on this age class in 1937. Less than 10 percent of the white pine acreage logged in the last 20 years is included in the present program.

In May 1953, the working agreement between the Forest Service and Bureau of Entomology and Plant Quarantine was modified, whereby the Bureau assumed full responsibility for the direct supervision of all Forest Service camps of the St. Joe Area. The Forest Service maintained all other controls, such as fiscal, transportation, supply, communication, and forest fire suppression. The shift of responsibility was made for economy reasons and to free Forest Service staffman H. O. Ficke for other activities. This new plan of operation proved to be effective and efficient. C. J. Miller, Forestry Aid on Forest Service blister rust, conducted the St. Joe National Forest spruce bark beetle surveys throughout the 1953 field season.

II. 1953 FIELD PROGRAM

The year 1953 marked the fourth in the present 5-year control program inaugurated in 1950. Fiscal year 1954 was the first year that federal appropriations were reduced below financial requirements for this program.

1. Expenditures - Calendar Year 1953

Bureau of Entomology and Plant Quarantine		
Leadership and Technical Direction	$16,774	
Blister Rust Control on State and Private Lands	45,117	$ 61,891
U. S. Forest Service		
Blister Rust Control on National Forests		339,770
State of Idaho		16,843
Potlatch Timber Protective Association		8,318
Total Expenditures		$426,822

2. Organization

The Forest Service control program included nine 45-man camps and a ribes eradication contract program. The Bureau of Entomology and Plant Quarantine operated two 50-man camps on state and private lands. These camps were financed by Potlatch Timber Protective Association, State of Idaho, and Federal Government funds.

Agency	Camps	Employees	Contracts
BEPQ - Cooperative	2	100	
U. S. Forest Service	9	450	6
Total	11	550	6

3. Progress on Ribes Eradication - 1953

Forest Service crews reworked pole stands in the Palouse, Oviat, St. Maries, and Slate Creek drainages. Seven of the nine Forest Service camps spent 1 to 2 weeks on fire suppression work during August. Due to this disruption, three camp areas were not completed. Poor ribes eradication work occurred when the crews returned from the fires and assumed their regular duties. Accomplishments in 1953 were comparable to those of 1952.

Crews of the Bureau camp near Elk River, Idaho, reworked the pole and reproduction stands in the vicinity. All currently required work was completed. The Bureau camp on the East Fork of Potlatch Creek spent the season performing initial work on the selectively logged areas of this drainage. Four truck-mounted power sprayers were operated from this camp. Generally, control work is progressing according to schedule. Accomplishments for 1953 are shown in the following table:

Agency	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
BEPQ - Cooperative	1,020	2,500	3,520	3,690	1,478,600	1.05	420
U. S. Forest Service	240	13,860	14,100	15,300	301,700	1.08	21
Total	1,260	16,360	17,620	18,990	1,780,300	1.08	101

4. Chemical Ribes Eradication

Chemical was used to treat 1,000 acres of heavy ribes concentrations on recently cutover areas and stream type. Five truck-mounted power sprayers were used to apply 2,4,5-T solution. Recently logged areas were broadcast sprayed at the rate of 300 to 400 gallons of chemical solution, requiring 1.08 man-days per acre. A chemical concentration of 2,4,5-T of 1500 p.p.m. was used during June and July and 2,000 p.p.m. during August and early September. Production was greatly increased over previous years by using an 800-gallon tanker-truck to

W-1592

Natural western white pine open pole stand occurring on lands that were broadcast-burned in 1916 following logging. Three workings were required to protect this stand from blister rust. Shattuck Creek drainage.

W-672

Snow damage in dense 41- to 60-year-old white pine pole stand of Palouse river drainage during winters of 1948-49 and 1949-50. The opening of these stands and the resulting soil disturbance caused heavy ribes germination and growth.

supply water to three of the power sprayers. This arrangement permitted continuous operation of the three sprayers. The sprayed areas were steep and only vehicles driving on all wheels could pull the grades. All men employed on hand eradication carried chemical for ribes decapitation purposes.

Inspection of the 1952 chemical work indicated that a very satisfactory ribes eradication job had resulted. A 99 percent kill was attained on the 326 acres of cutover lands that were broadcast sprayed on Fry Creek in 1952. Light ribes regeneration is taking place in the soil disturbed by the bulldozer in converting cat trails to truck trails.

Agency	Acres	Man-Days	Ribes	Gallons
BEPQ - Cooperative	1,000	1,080	1,433,710	296,000

5. Contract Ribes Eradication

Ribes eradication contractors completed six contracts for a total of 290 acres. The average cost per acre was $33.70. Contract work was financed by the Forest Service. The work was confined to the reproduction and plantation areas of Willow and Charlie Creek drainages near Emida, Idaho. All contract areas supported low, dense plant growth with scattered, small ribes. The presence of a few seedlings made it necessary to place all these areas on post check following the 1953 working. Three additional contracts have been awarded for completion in 1954. An additional 490 acres have been surveyed for contracting in 1954. Ribes eradication by contract will be increased as rapidly as contractors become available.

Agency	No. Contracts	Acres	Man-Days	Ribes	Amount Paid
U. S. Forest Service	6	290	440	5,500	$9,773.80

6. Checking and Surveys

All checking activities were managed by the Bureau with a Forest Service checker foreman assisting. There were 18 men in the checking organization. Checking was kept current in order to expedite rework and to maintain a close inspection of the efficiency of each ribes eradication worker. Approximately 17,500 acres were inspected by regular check and 19,600 by post check. No stocking-damage surveys were conducted.

The summer and fall of 1953 did not appear to be favorable for either local intensification or long distance spread of blister rust. Rust on ribes was medium to light. The weather throughout September and October was unusually dry.

III. CONTROL STATUS

STATE AND PRIVATE UNITS

The present control program on state and private lands is composed of 16 units comprising 67,000 acres. Of this area, 57,000 acres have been initially worked and 52,500 acres have been reworked. As a result of these workings, 26,900 acres have been placed on maintenance. The remainder of the area, with the exception of recently cutover lands, is near maintenance. Recent post check surveys show that most areas placed on maintenance remain in that status. The main exception occurred in dense pole stands in the St. Maries River drainage that were hard hit by snow damage in the winter of 1948-49, and subsequent years. Serious ribes regeneration and growth occurred in the stand openings caused by snow breakage.

Outside the present control area are 140,000 acres of state and private lands representing mature white pine stands or highly productive units of recent cutover. No additional protection work is planned for these lands until control work on the present program units is completed or additional funds are made available for expanded control activities.

1. State and Private units being protected under the present BRC program:

Ownership:	
Federal	13,000 Acres
State	17,000 Acres
Private	37,000 Acres
Total	67,000 Acres
Estimated Yield:	1,382,123 MBF
Estimated 1950-1970 BRC Costs:	$1,378,120
Area Worked:	
Initial	57,000 Acres
Rework	52,500 Acres
Area on Maintenance:	
Immature Stands	26,100 Acres
Mature Stands	
On maintenance	800 Acres
Deferred Working	8,400 Acres

Power sprayer filling from 800-gallon tanker. This tank-truck kept 3 power sprayers supplied with water; daily requirements were 4,000 to 5,000 gallons.

Power sprayer and crew in operation on East Fork of Potlatch Creek. Five to six nozzles were operated off of each power sprayer. Area logged in 1947.

W-227

2. State and Private units not being protected under the present BRC program:

Ownership:

Federal	15,000 Acres
State	40,000 Acres
Private	85,000 Acres
Total	140,000 Acres

Estimated Yield: 3,487,665 MBF

Estimated 1950-1970 BRC Costs: $6,139,340

Area Worked:

Initial	46,000 Acres
Rework	300 Acres

Area on Maintenance:

Immature Stands	7,800 Acres
Mature Stands	
On Maintenance	16,000 Acres
Deferred Working	88,000 Acres

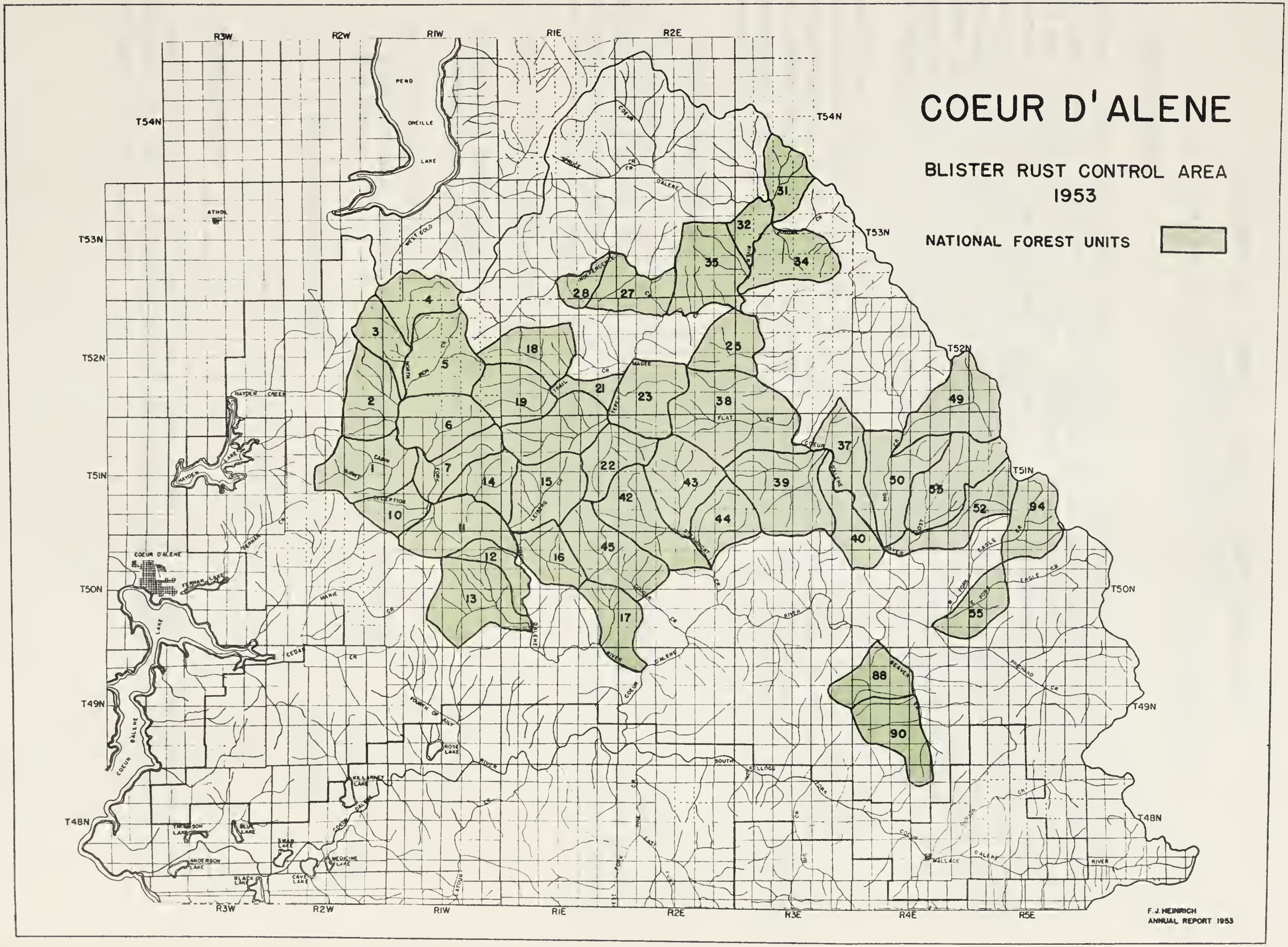
NATIONAL FOREST UNITS

There are 27 units comprising 135,000 acres in the present Forest Service control program. Initial ribes eradication has been performed on 130,200 acres of this area, and 165,000 acres of rework have been accomplished. As a result of these workings, 61,000 acres of immature stands meet maintenance standards. Most of the remaining area is approaching maintenance. The extensive snow damage in the dense pole stands of the Palouse and St. Maries River drainages caused much of the area on maintenance to revert to a rework classification. However, maintenance areas in open pole and reproduction type, where no snow damage has occurred, have remained relatively free of ribes.

No additional control work is planned for the white pine stands of the Bird, Eagle, Quartz, Bruin, Gold, and Simmons Creek drainages. These lands are solid Forest Service ownership. The disease survey conducted on these mature stands in 1951 showed that the present timber crop must be harvested within the next 30 years to avoid heavy loss from blister rust.

National Forest units being protected under the present BRC program:

Ownership:	
Federal	96,000 Acres
State	12,000 Acres
Private	27,000 Acres
Total	135,000 Acres
Estimated Yield:	2,248,819 MBF
Estimated 1950-1970 BRC Costs:	$2,871,200
Area Worked:	
Initial	130,240 Acres
Rework	165,000 Acres
Area on Maintenance:	
Immature Stands	61,000 Acres
Mature Stands Deferred Working	13,000 Acres


COEUR D'ALENE
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
T54N
T53N
T52N
T51N
T50N
T49N
T48N
PEND OREILLE LAKE
ATHOL
HAYDEN LAKE
HAYDEN CREEK
COEUR D'ALENE
FERNAN LAKE
ROSE LAKE
KILLARNEY LAKE
THOMPSON LAKE
BLUE LAKE
SWAN LAKE
MEDICINE LAKE
ANDERSON LAKE
BLACK LAKE
CAVE LAKE
WALLACE
F. J. HEINRICH
ANNUAL REPORT 1953

BLISTER RUST CONTROL, COEUR D'ALENE AREA, 1953

F. J. Heinrich, Area Leader
C. J. Pederson, Forest Officer, U. S. Forest Service

I. INTRODUCTION

Blister rust control work was initiated on the Coeur d'Alene National Forest by the Division of Blister Rust Control on an experimental basis in 1927 with 120 men working out of 5 camps. Control work financed by the Forest Service started in 1932. The largest program of ribes eradication was in 1934 when over 2,000 men worked from 31 NIRA and 14 ECW camps. Control efforts have been directed toward the protection of reproduction and pole stands including 15,000 acres of white pine plantations. The oldest plantation is of 1922 origin on lands burned over in 1919 and the most recent was established in 1949. The valuable pole stands receiving protection are mainly of 1889 origin.

Hand ribes eradication methods were used at the start. Mechanical ribes eradication, using a bulldozer with a specially designed blade, was used effectively on 1,200 acres of heavy ribes concentrations in brushy stream bottoms during the early thirties. Chemical ribes eradication methods, although introduced in 1928, have been given renewed impetus since the advent of the brush killer, 2,4,5-T.

II. 1953 FIELD PROGRAM

Work objectives for 1953 were to complete currently needed work in young stands and to start chemical ribes eradication on the Steamboat cutover area in the Clay Creek working unit. This program was in accordance with the fourth year of the 1950-54 control work plan.

1. Expenditures - Calendar Year 1953

Bureau of Entomology and Plant Quarantine		
Leadership and Technical Direction		$ 5,949
U. S. Forest Service		
Blister Rust Control on National Forests	$150,190	
K-V Funds	14,765	164,955
Total Expenditures		$170,904

2. Organization

Six camps including one spray camp were operated in 1953. The peak employment was 160 men. Contract ribes eradication was expanded in 1953 with 25 contracts being awarded.

3. Progress on Ribes Eradication - 1953

Accomplishments fell short of the 6,000 acres objective. Time lost on fire suppression and a reduction in funds were contributing factors.

Agency	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
U. S. Forest Service	480	3,870	4,350	4,810	133,600	1.11	31

4. Chemical Ribes Eradication

Chemical ribes eradication methods have become an integral part of the ribes suppression program. With the use of specialized spray equipment, most areas supporting concentrations of ribes can be treated economically. Three truck-mounted power sprayers and three portable power spray units were used throughout the summer. The largest power spray job was located at the head of the Little East Fork of Steamboat Creek where 200 acres of cutover lands were treated. Hi-Fog guns and knapsack sprayers were used on the smaller areas. Excellent results have been obtained. However, the chemical must be properly applied and its limitations recognized.

Agency	Acres	Man-Days	Ribes	Gallons
U. S. Forest Service	420	850	87,100	99,140

5. Contract Ribes Eradication

Contract work was successfully completed on 1,190 acres. Twenty-five contracts were awarded, four being in the Lost Fork of Jordan Unit and the remainder in the Brett Creek Unit. Work was performed by 9 contractors employing 19 men. Contracts awarded after mid-season were written under terms whereby ribes were to be reduced to where none was found on the check on any 10-acre parcel. Award prices ranged from $11.49 to $22.80 per acre or an average of $18.09, representing a savings of 25 percent over comparable work by regular crews. All contracts were completed except four in the Brett Creek Unit.

Agency	No. Contracts	Acres	Man-Days	Ribes	Amount Paid
U. S. Forest Service	25	1,190	910	7,900	$19,763

W-1500

Coeur d'Alene National Forest, Little East Fk. Steamboat Cr. Truck-mounted power sprayers were used to broadcast-treat this 220-acre block with 2,4,5-T.

6. Control Burning

Prescribed burning as a silvicultural treatment has been practiced on the Coeur d'Alene Area for several years. During the past 3 years, 1,225 acres involving 4 units have been burned as one preparatory step toward future white pine plantings. The chemical eradication of established ribes will be started on the Potter Creek burn area in 1954. Two areas will be treated in 1955 and the fourth in 1956. When the rust hazard from ribes has been eliminated, these areas will be planted to white pine.

7. Checking and Surveys

Checking and survey activities were satisfactorily performed by 12 men. One checker was assigned to each camp. The remaining men checked contracts, post checked, or assisted with regular crew checking. Checkers assisted camp superintendents in establishing work area boundaries, trained men in laying lane lines, and checked lots as they were completed by the crewmen. Post check was performed on 2,500 acres. Stocking and pine damage survey crews obtained representative disease data on 5,000 acres of young pine stands. No significant increase in infection over that of previous surveys was shown.

III. CONTROL STATUS

The first known blister rust on white pine in the Coeur d'Alene Area was of 1923 origin. Throughout the intervening years the objective has been to set up a long-range blister rust control program commensurate with the timber growing capacity of the land, future stumpage demands, and reasonable protective expenditures. During this transitionary period, the control acreage has varied. The present control program as adopted in 1950, comprises 269,000 acres of selected white pine growing land. This acreage includes 137,000 acres now on maintenance or mature stands which will not require future working to protect the present crop. Unworked areas total 87,000 acres. The remaining 45,000 acres are only partially protected and will need additional work. Severe snow damage in pole stands during the winters of 1949, 1950, and 1951 caused ground disturbance and canopy openings which create additional problems and increase control costs.

Progress has been made toward control even though blister rust has become established throughout the Coeur d'Alene National Forest. Close integration of blister rust control with other forest management practices is being accomplished and white pine is being grown on selected control units.

National Forest Units Being Protected under the Present BRC Program:

Ownership:

Federal	257,600 Acres
State	4,400 Acres
Private	7,100 Acres
Total	269,100 Acres

Estimated Yield: 5,058,000 MBF

Estimated 1950-1970 BRC Costs: $6,959,975

Area Worked:

Initial	181,806 Acres
Rework	58,035 Acres

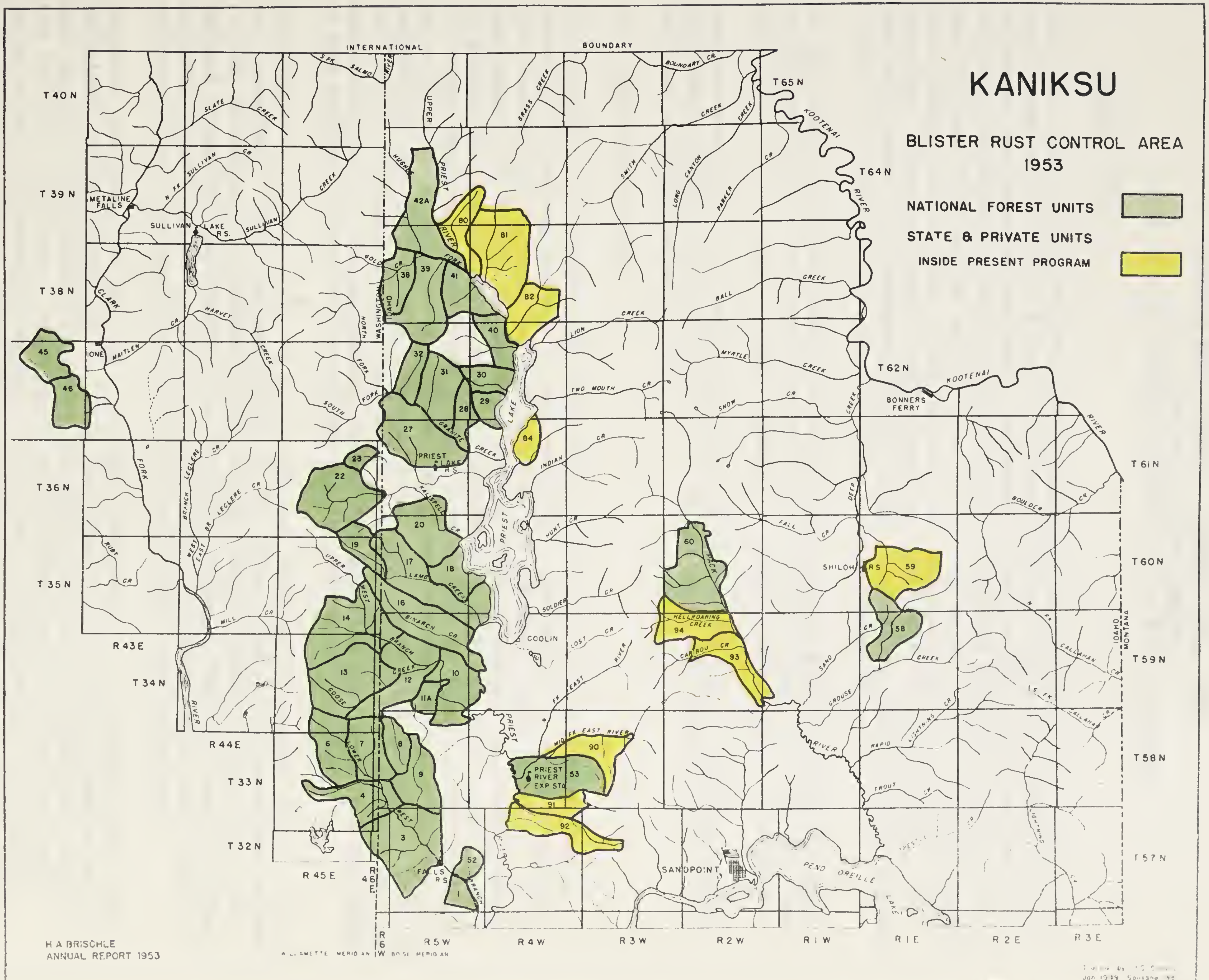
Area on Maintenance:

Immature Stands	24,844 Acres
Mature Stands	
On Maintenance	12,562 Acres
Deferred Working	91,432 Acres

W-1502
Coeur d'Alene National Forest, Snyder Creek 1952 control burn. Insert shows ribes seedlings in fall 1953. Chemical treatment of ribes scheduled for 1955.

W-1564

Coeur d'Alene National Forest, Potter Creek 1951 control burn. Insert shows ribes seedlings in 1953. Chemical treatment of ribes scheduled for 1954.



KANIKSU
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
STATE & PRIVATE UNITS
INSIDE PRESENT PROGRAM
INTERNATIONAL
BOUNDARY
T 40 N
T 39 N
T 38 N
T 36 N
T 35 N
T 34 N
T 33 N
T 32 N
T 65 N
T 64 N
T 62 N
T 61 N
T 60 N
T 59 N
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R 43 E
R 44 E
R 45 E
R 46 E
R 6 W
R 5 W
R 4 W
R 3 W
R 2 W
R 1 W
R 1 E
R 2 E
R 3 E
METALINE FALLS
SULLIVAN LAKE R.S.
IONE
PRIEST LAKE R.S.
COOLIN
SHILOH
BONNERS FERRY
SANDPOINT
PRIEST RIVER EXP STA
FALLS R.S.
PRIEST LAKE
PEND OREILLE LAKE
KOOTENAI RIVER
IDAHO
MONTANA
WASHINGTON
IDAHO
H A BRISCHLE
ANNUAL REPORT 1953

BLISTER RUST CONTROL, KANIKSU AREA, 1953

H. A. Brischle, Area Leader
H. J. Viche, Project Officer, U. S. Forest Service

I. INTRODUCTION

The first blister rust control work on the Kaniksu Area was done in 1923 by two 5-man crews at the Priest River Experiment Station. The Benton Creek Drainage was chosen as the area for work. An excerpt from the 1923 annual report is as follows: "An area of about 3 acres situated south and southeast of the Experiment Station buildings on Benton Creek had a very heavy growth of *Ribes inerme*. These bushes grew in such a tangled mass of vegetation that pulling was rendered very slow. From this area 15,000 ribes were removed." The effectiveness of this early work is in evidence by the absence of blister rust in the fine stand of 60- to 80-year-old pole stand surrounding this first work area.

In 1924 and 1925 control was done in the upper Priest River drainage by small crews working from two rather primitive pack camps. A number of the personnel employed in these camps is still engaged in blister rust control activities.

Work was continued on a small scale in 1928, 1931, and 1932. Larger programs followed in 1934, 1935, and 1936, with the advent of CCC and ERA labor. Work has been continued annually since.

II. 1953 FIELD PROGRAM

At the peak of the season, 325 men were employed in 7 Forest Service and 1 Bureau of Entomology camps. A late spring and continued bad weather hampered the construction of camps and the training of the first crews to arrive. Two pack camps were located in the Upper Priest River drainage. One camp located at Navigation Administrative Site on Upper Priest Lake was serviced by boat. All other camps were located on roads. A good class of labor, mostly students 18 to 22 years of age, was available. Many were second-year men. Weather permitting, the crews worked a 48-hour week. The camps were called to fires on the Lolo and Nezperce Forests and several on the Kaniksu. A total of 2,620 man-days was spent on fire suppression work. The turnover was normal for the number of men employed. Many of the workers plan to return next season.

The 1953 work by the Bureau of Entomology was confined to cutover areas in the Big Creek unit. Over the past 20 years, the ribes populations have been reduced to near maintenance standards on most of this area. However, there are some parcels of ground where small ribes persist. Although recently developed chemical methods accomplish control in a much shorter period at less cost, previous workings have so reduced the ribes that such methods were impractical.

Emphasis was placed on the use of chemical wherever it could accomplish a more efficient job and reduce costs. This was done by coordinating chemical with hand eradication methods. Chemical was applied by the most practical method for the individual area. Four truck-mounted power units and four portable units as well as back-pack equipment were used. A lightweight, air-cooled, portable power unit developed by J. F. Breakey was back-packed $3\frac{1}{2}$ miles and used on an isolated area on Trail Creek. A canvas tank and light 3/8" and 1/4"

hose were used to cut down weight and increase the mobility of the outfit. Truck-mounted units handled the bulk of the chemical work. However, substantial savings were made by using back-pack units on small, selected areas of heavy ribes, sometimes less than a $1\frac{1}{4}$-acre lot.

A $3\frac{1}{2}$-mile project road was constructed from Sema Pass into the head of Kalispell Creek to facilitate chemical work in heavy ribes concentrations adjacent to the Kalispell Creek Plantation. This road was constructed with heavy equipment in less than 2 weeks at an over-all cost of approximately $2,000. This road will serve to facilitate all phases of blister rust control and timber management in that vicinity.

Contract work was also emphasized and contracts were awarded for areas of rework in the Tiger Hill, Upper Lamb Creek, Big Creek, and Tunnel Creek units. Close to 1,900 acres were worked by 22 contractors at an average bid price of approximately $13 per acre. Contract work continues to be the most economical means for doing ribes eradication on small, scattered areas of rework. Over 9,600 acres have been handled by contractors since 1947.

For the first time K-V funds were used for blister rust control work on cutover areas in the Pelke, Goose Creek, Tango Creek, and Dubius Creek units. An area of 80 acres in the Pelke unit was control burned in September with good results. Control burning was started on this unit in 1952 and it is planned to burn 80 to 100 acres of clear-cut area each year. Planting will be done on all areas when ribes suppression is completed. During the spring, 103,000 white pines were planted on 210 acres in the Diamond Peak, Kalispell Creek, Kalispell Bay, Tunnel Creek, and Pee Wee Creek units. The survival in all instances was good.

To complete all necessary regular and post check, one Bureau of Entomology and 23 Forest Service checkers were employed. Eleven of these men were experienced having checked from 1 to 4 years. The remaining men had some checking training the previous year including the use of compass and the fundamentals of pacing. All checkers were under the supervision of Q. W. Larson of the Bureau of Entomology and Plant Quarantine. A total of 14,000 acres of rework area was post checked and of this amount, 3,000 acres were sufficiently low in ribes population to be deleted from further crew work. In addition to the checking and survey work, checkers were responsible for stringing the camp area boundaries and lot lines for crew work.

A checking experiment is being conducted to determine a correlation between total ribes populations on a lot and the number found by the crews on first working. When analyzed, the results should prove invaluable in determining areas that need rework without conducting a check.

1. Expenditures - Calendar Year 1953

Bureau of Entomology and Plant Quarantine		
Leadership and Technical Direction	$ 13,985	
Blister Rust Control on State and Private Lands	15,601	$ 29,586
U. S. Forest Service		
Blister Rust Control on National Forests	300,766	
K-V Funds	3,590	304,356
State of Idaho and		
Priest Lake Timber Protective Association		5,949
Total Expenditures		$439,891

2. Organization

Agency	Camps	Employees	Contracts
BEPQ - Cooperative	1	25	5
U. S. Forest Service	7	300	27
Total	8	325	32

3. Progress on Ribes Eradication - 1953

Agency	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
BEPQ Cooperative		1,000	1,000	1,050	38,000	1.05	38
U. S. Forest Service	1,400	14,610	16,010	10,350	548,000	.65	34
Total	1,400	15,610	17,010	11,400	586,000	.67	34

4. Chemical Ribes Eradication

Agency	Acres	Man-Days	Ribes	Gallons
BEPQ - Cooperative	50	30	4,000	1,210
U. S. Forest Service	1,110	1,560	407,000	163,490
Total	1,160	1,590	411,000	164,700

5. Contract Ribes Eradication

Agency	Number of Contracts	Acres	Man-Days	Ribes	Amount Paid
BEPQ - Cooperative	5	140	110	4,000	$ 2,433
U. S. Forest Service	27	1,750	960	40,000	21,246
Total	32	1,890	1,070	44,000	$23,679

III. CONTROL STATUS

STATE AND PRIVATE UNITS

A 20-year blister rust control work plan for state and private lands comprises 10 units of 58,000 acres on which it is estimated 683,000 MBF of white pine can be economically produced. This program will require 25,000 man-days for the period 1950-70. It is estimated the cost for this work will be 73¢ per thousand board feet of white pine produced.

Three of the units are in intermingled federal and private ownership in the Pack River and Trail Creek drainages. The remainder of the units is in the Priest Lake watershed on lands administered by the Priest Lake Timber Protective Association.

State and Private units being protected under present BRC program

Ownership:

Federal	11,000 Acres
State	33,000 Acres
Private	14,000 Acres
Total	58,000 Acres

Estimated Yield: 682,979 MBF

Estimated 1950-1970 BRC Costs: $499,000

Area Worked:

Initial	50,000 Acres
Rework	35,000 Acres

Area on Maintenance:

Immature Stands	29,000 Acres

W-1152

Fox Creek, PLTPA. 1928. State timber sale area. Logged by Diamond Match Co. to 12" diameter. Brush piled and burned. Skids for donkey engine in foreground.

W-1152-1

Same area in 1953. Residual timber has disappeared from windthrow and insect damage. Area now well stocked with rapid growing W.W.P. protected from blister rust. Old skid timbers in foreground.

NATIONAL FOREST UNITS

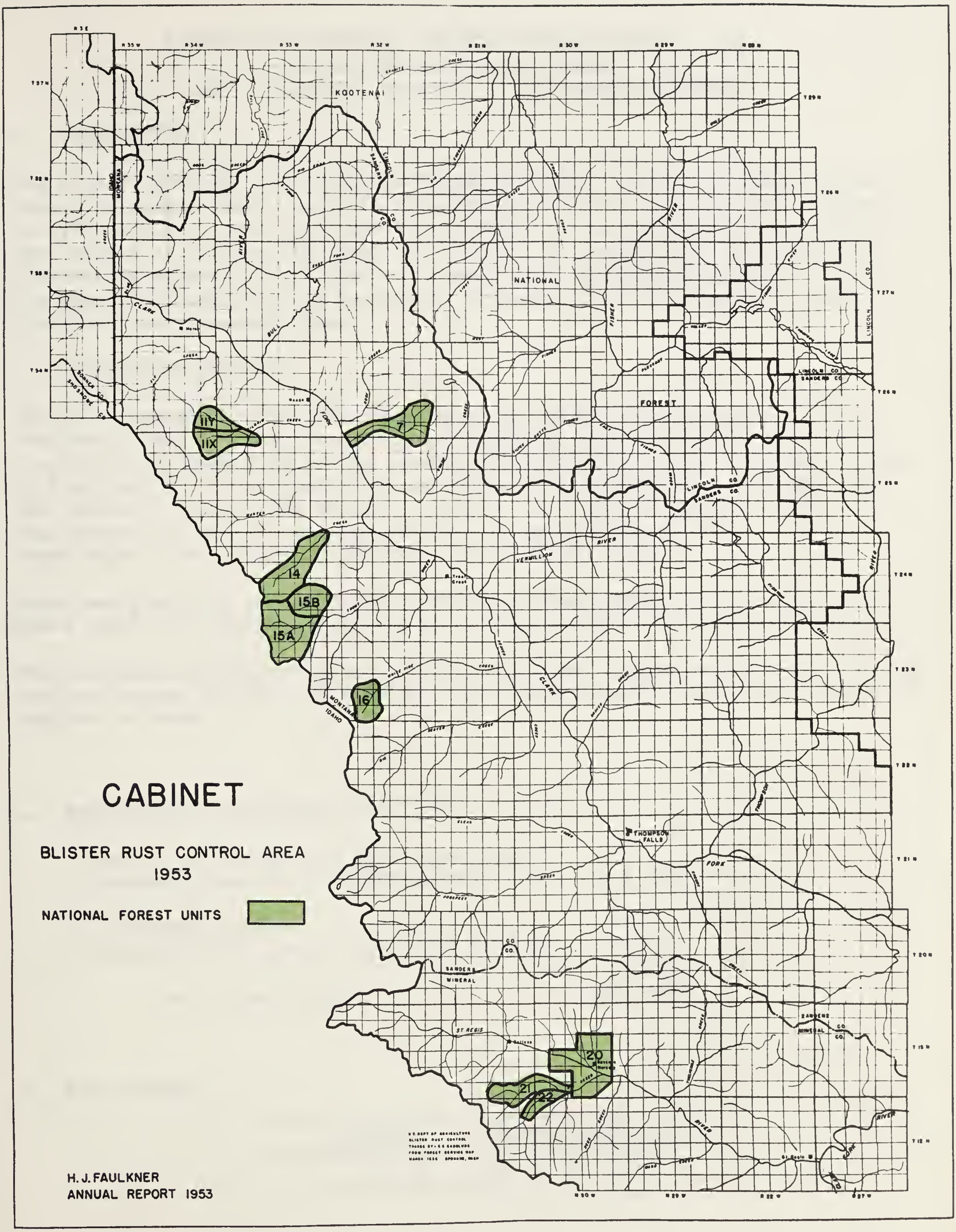
A 20-year work program for National Forest lands has been developed. This plan comprises 36 high priority white pine producing areas of 212,000 acres on which it is estimated 4.03 billion board feet of white pine can be economically produced at rotation age. First control work on this program was started in 1950. It was estimated that it would require 73,600 man-days over a 7-year period to place the top 24 units on a maintenance basis. In the 4-year period through 1953, the work has progressed on schedule.

The boundaries of six blister rust working units were adjusted to more closely fit topographic features and ownership patterns in the Tiger Hill, Dubius Creek, Pelke, Diamond Peak, Hughes Ridge, and Muddy Creek units. Area of nonfederal ownership on Forest Service units was eliminated along with area of poor site along ridges. Area was added where it was found possible to give protection at a reasonable cost. A total of 2,978 acres was added on six units while 3,383 acres were eliminated, making a net difference of 405 acres less in the total control area.

As a result of the 1953 work and post check by Forest Service crews, 15,300 acres were placed on maintenance in National Forest units. Over 100,000 acres, or about 50 percent of the control area, now meet maintenance standards. Some units are over 80 percent maintenance while some, where recent cuttings have occurred, are as low as 25 percent. Maintenance figures are variable and are constantly changing due to cutting, or other ground disturbance in the stands. Recent insect infestations and salvage logging operations are at present important factors. Thus far, spruce bark beetle infection and subsequent logging operations have affected only the Boulder Creek unit. The logging of mature stands in the headwaters of this unit was not in the original 20-year plan. The additional blister rust work load created by logging disturbances will be in part financed by K-V funds.

National Forest units being protected under the present BRC program (38 units)

Ownership:	
Federal	190,000 Acres
State	1,000 Acres
Private	21,000 Acres
Total	212,000 Acres
Estimated Yield	4,031,000 MBF
Estimated 1950-1970 Costs:	
Regular	$2,633,000
K-V	406,000
Total	$3,039,000
Area Worked:	
Initial	169,000 Acres
Rework	95,000 Acres
Area on Maintenance:	
Immature Stands	92,000 Acres
Mature Stands	
On Maintenance	400 Acres
Deferred Working	9,000 Acres


CABINET
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
H. J. FAULKNER
ANNUAL REPORT 1953
KOOTENAI
NATIONAL
FOREST
IDAHO
MONTANA
LINCOLN CO.
SANDERS CO.
MINERAL CO.
THOMPSON FALLS
11Y
11X
7
14
15B
15A
16
20
21
22

BLISTER RUST CONTROL, CABINET NATIONAL FOREST, 1953

H. J. Faulkner, Area Leader
Neil Fullerton, Forester, U. S. Forest Service

I. INTRODUCTION

The present program on the Cabinet Forest includes 9 units, 31,760 acres of immature stands. The 6 units in the Clarks Fork River drainage are composed of natural and planted reproduction on 1910 burn and reburned areas. White pine stands in the two Big Creek units in the St. Regis River drainage are plantations established in 1924 on areas logged in 1918 and burned in 1919. The Savenac Nursery unit is maintained principally to protect white pine planting stock produced there.

II. 1953 FIELD PROGRAM

The 1953 program included two camps that performed both hand and chemical eradication and a 6-man crew for power spraying only. One 60-man camp was located on the west fork of Big Creek for rework in the middle and west forks of Big Creek and in protection zones around Savenac Nursery. A 25-man camp was located on White Pine Creek to complete 200 acres of initial work, to rework spots in the plantations, and to mop up all stream type. A 6-man power spray crew was established July 27 on Minton Ridge.

Labor was plentiful and of better quality than employed during the past few years due to the higher percentage of college men and fewer high school boys.

Fire seriously interfered with control operations. Numerous fire calls during July and August resulted in a large labor turnover and decreased efficiency of eradication work.

1. Expenditures - Calendar Year 1953

Bureau of Entomology and Plant Quarantine Leadership and Technical Direction	$ 3,085
U. S. Forest Service Blister Rust Control on National Forests	86,211
Total Expenditures	$89,296

2. Organization

Agency	Camps	Employees
U. S. Forest Service	3	85

3. Progress of Ribes Eradication - 1953

Agency	Initial Work Acres	Rework Acres	Total Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
U. S. Forest Service	760	1,310	2,070	2,440	95,000	1.18	46

4. Chemical Ribes Eradication

Type of Equipment	Acres	Man-Days	Ribes	Gallons	Per Acre Man-Days	Per Acre Ribes	Per Acre Gallons
Power, Truck-Mounted	70	150	31,000	25,400	2.24	443	363
Knapsack and Hi-Fog Gun	520	430	19,000	2,990	.83	37	6
Total	590	580	50,000	28,390	.98	.85	48

The knapsack and Hi-Fog gun spraying included 20 acres initial upland in heavy concentrations of Ribes lacustre in the White Pine Creek unit and 40 acres of stream type mop-up. The remaining 460 acres were worked on an extensive coverage of stream type on Big Creek, Savenac Creek, and the St. Regis River within the nursery protection zone and Big Creek units. Ribes were generally light especially within the nursery protection zones; however, considerable time was required to scout the wide and brushy stream bottoms.

The truck-mounted power sprayer was used from late June until July 25 to respray 40 acres of reproduction type on Gilt Edge Creek initially sprayed in 1951. On July 28, spraying was started in the head of Martin Creek, respraying area initially covered in 1950. Lost time due to fire and late August rains prevented completion of planned work.

Damage to hose lines and other equipment by porcupines was a serious problem both at Big Creek and Minton Ridge. To prevent damage to hose lines, it was necessary to hang all main lines in small trees or brush that could not be climbed by the porcupines. Lateral lines were coiled each night and hung up in safe places. As a result, considerable effective spraying time was lost each day.

5. Checking and Surveys

The regular checking force varied from three to five men during the summer. Additional men were given checker training and used on flanker check, stringing lane lines, and post checks as needed. Checkers also performed flanker eradication on areas supporting few ribes. Advance surveys and post checks were run on 4,200 acres for planning current season and future work.

III. CONTROL STATUS

National Forest units being protected under the present BRC program

Ownership:

Federal	28,180 Acres
State	650 Acres
Private	2,930 Acres
Total	31,760 Acres

Estimated Yield: 338,000 MBF

Estimated 1950-1970 BRC Costs: $379,000

Area Worked:

Initial	27,400 Acres
Rework	8,400 Acres

Area on Maintenance:

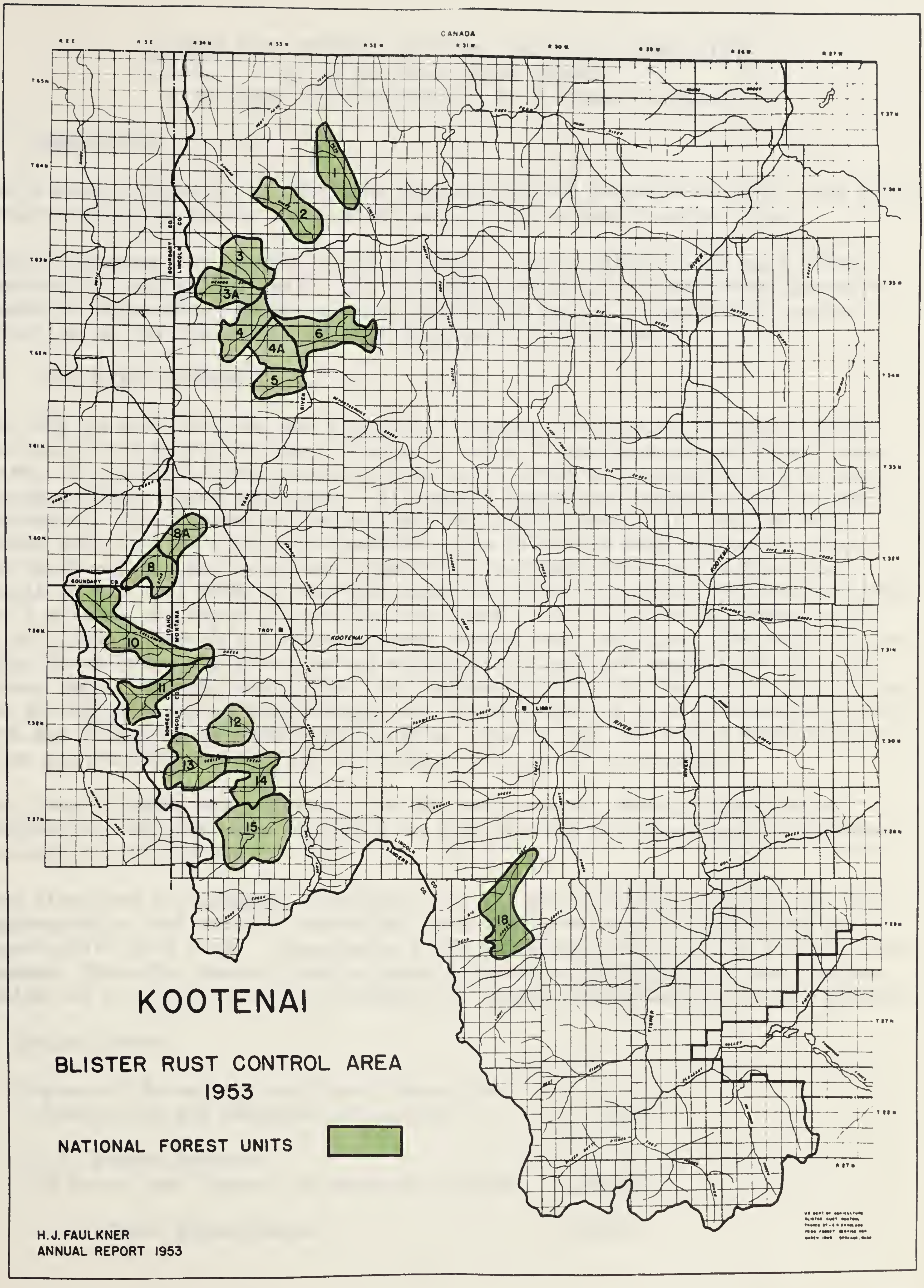
Immature Stands	15,000 Acres

Ecological conditions on the Cabinet Forest have favored the establishment and persistence of heavy populations of ribes on most areas. Blister rust control was started and has been carried on during the period in the life of the stands when ribes and associated brush had reached their peak of development and before reproduction reached a size to aid control by shading out a portion of the intolerant ribes and brush species. As a result, workings have been costly and maintenance standards difficult to attain.

Rework was completed in the Big Creek units this year. Repeated workings have failed to reduce ribes to maintenance standards on portions of the area due to the persistence of numerous small _R. lacustre_. The stand is reaching a size and density where natural suppression will become a factor in ribes suppression. Future workings will not be undertaken unless disease surveys show that the few remaining small ribes are causing damage.

Ribes have continued to recur in stream type on Savenac Creek, Big Creek, and St. Regis River within protection zones for the Savenac Nursery. Rework of stream type this year should afford protection for the nursery for several years. An examination of 6,000 white pine transplants in the nursery showed 14 infected, which is the lowest incident of infection found for several years.

Initial work was completed in the White Pine Creek unit this year. No further extensions will be made in protection zones unless future disease surveys show that rust is spreading into plantations from ribes outside the present zones. Although rust has been present in the unit for 20 years, build-up has been very slow and it does not appear likely at this time that extension of the protection zones will be necessary.


CANADA
KOOTENAI
BLISTER RUST CONTROL AREA
1953
NATIONAL FOREST UNITS
H. J. FAULKNER
ANNUAL REPORT 1953
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BLISTER RUST CONTROL, KOOTENAI NATIONAL FOREST, 1953

H. J. Faulkner, Area Leader
M. D. Oaks, Forest Officer, U. S. Forest Service

I. INTRODUCTION

The present program on the Kootenai National Forest includes 12 units with 83,000 acres of immature stands and 5 units with 41,000 acres of mature type.

Control programs for several years have been concentrated in the high value reproduction and pole stands. The objective has been to place these immature stands on maintenance before planned cutting in mature necessitates giving attention to the protection of reproduction on cutover lands.

II. 1953 FIELD PROGRAM

The 1953 program included two 20-man road camps, one located on Cherry Creek and one at the Sylvanite Ranger Station, and a 20-man packcamp on Upper Burnt Creek. The Cherry Creek camp completed 1,370 acres of re-eradication in the Cherry and Bear Creek drainages. All upland areas were worked to maintenance standards. Sixty acres sprayed on Bear and Leigh Creeks will require some future work to meet required standards. The Sylvanite camp performed second and third working in the stream type along the Yaak River and in the pole stands on the west side of the Yaak from the Sylvanite Station to Cyclone Creek and 1 mile up the south side of Cyclone Creek. All pole stands were placed on maintenance except a few small areas around rock outcrops. The pack camp on upper Burnt Creek performed second working in upland and second and third in stream type. Working conditions were extremely difficult in reproduction types due to many windfalls, snow damage, and dense brush. A high percentage of this area was worked to maintenance standards. Due to the density of reproduction, ribes are rapidly shading out and future work may be unnecessary.

The class of labor was improved over the past several years. Experienced overhead and workers were available to fill all key positions and new workers were mostly college men.

Fire disrupted the program. On August 14, all personnel were called for fire suppression on and off the forest and very little blister rust work was performed after that date. Approximately 350 man-days were lost from project work. However, favorable factors such as good weather, efficient labor, and the expanded use of chemical made it possible to complete camp assignments as planned.

1. Expenditures

Bureau of Entomology and Plant Quarantine Leadership and Technical Direction	$ 3,085
U. S. Forest Service Blister Rust Control on National Forests	52,256
Total Expenditures	$55,341

2. Organization

Agency	No. Camps	No. Employees
U. S. Forest Service	3	50

3. Progress on Ribes Eradication - 1953

Agency	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
U. S. Forest Service	2,460	1,690	90,000	.69	37

4. Chemical Ribes Eradication

Type of Equipment	Acres	Man-Days	Ribes	Gallons Spray	Per Acre Man-Days	Per Acre Ribes	Per Acre Gallons
Knapsack	50	40	9,000	390	.80	180	8
Bean-Cutler	70	140	20,000	20,070	2.0	286	287
New Portable	60	70	27,000	12,390	1.17	450	207
Total	180	250	56,000	32,850	1.39	311	183

Chemical was used extensively in the eradication of stream type ribes on Burnt, Cherry, and Bear Creek drainages. The 50 acres of knapsack spraying shown in the preceding table were on upper Burnt Creek and its tributaries. Many of the bushes treated were seedlings or small resprouts originating after the initial spray job. This condition together with narrow stream type and light associated vegetation made it favorable for treatment with knapsack equipment.

The new experimental lightweight portable power sprayer was used in wide and brushy stream bottom on main Burnt Creek. Some mechanical trouble was experienced but was mostly eliminated when the 2-cycle engine was replaced with a 4-cycle unit. This outfit demonstrated its value for treatment of remote areas where it is difficult or impossible to transport a heavier unit. It also demonstrated superiority over knapsack equipment where large volumes of spray are necessary to penetrate debris or heavy vegetation and by broadcasting to avoid the time lost searching for small bushes.

5. Checking and Surveys

Four checkers completed a regular check on all worked areas with the exception of the sprayed areas. Advance surveys were run where needed for planning current year's work. Post checks were run on 2,000 acres in the Burnt Creek and Cyclone Creek units for information on ribes conditions for planning 1954 work.

III. CONTROL STATUS

National Forest Units Being Protected under the Present BRC Program

Ownership:	
Federal	122,000 Acres
Private	2,000 Acres
Total	124,000 Acres
Estimated Yield:	1,627,000 MBF
Estimated 1950-1970 BRC Costs:	$880,000
Area Worked:	
Initial	55,000 Acres
Rework	9,000 Acres
Total	64,000 Acres
Area on Maintenance:	
Immature Stands	27,000 Acres
Mature Stands	8,000 Acres
Total	35,000 Acres
Deferred Working	20,000 Acres

The planned program in the immature units is progressing according to schedule. Advance reproduction and pole stands are being worked to maintenance standards as rapidly as possible. All work was completed in the Cherry-Bear Creek unit and the Burnt Creek unit in 1953 with the exception of a small amount of work in the Grizzly Creek fork of Burnt Creek. Cyclone and Red Top Creek units are scheduled for completion in 1954. The cutting of small stands of mature within the immature units to salvage insect infested spruce timber will in some cases delay complete protection. Rework was completed in the Spar Lake unit in 1952. This year several miles of road were constructed through the Fairway Creek pole stand to salvage a small block of spruce lying above the protected pole stands. Careful timing to control ribes germinating along the access road and the logging area will be necessary to prevent severe damage to the previously protected pole.

BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1953

J. C. Gynn, Area Leader
C. M. Chapman, District Leader

I. DESCRIPTION AND HISTORY

Mount Rainier National Park has 4,500 acres in two blister rust control units. The White River unit has whitebark pine of particular aesthetic value at high elevations in and around the Sunrise Park camp and picnic areas. Directly below on precipitous slopes, western white pine pole forms a dense backdrop for the White River campground. The Longmire-Silver Forest unit grows western white pine intermingled with fir, cedar, and hemlock. Ribes were originally very heavy. Climatic and ecological conditions are ideal for ribes growth and seed germination. The disease was well established throughout the Park before control work was started in 1930. Damage has been heavy. In several drainages outside the control areas, white pine has been nearly eliminated by the disease. Most of the mature trees in the two units were infected before control was established, but will continue to be a valuable seed source for many years. Infection in the young trees is light.

II. 1953 FIELD PROGRAM

The crew was composed of a camp superintendent and 15 men. All work was confined to the Longmire-Silver Forest unit. The objective in 1953 was to destroy the ribes seedlings which recent checking surveys showed to be present. All work was completed as planned.

1. Expenditures by the National Park Service in calendar year 1953, $11,132.32

2. Progress of Ribes Eradication - 1953

Area	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Longmire-Silver Forest	710	560	27,000	.79	38

The one-man dragline system was used on all areas except 10 acres of seedling concentrations treated by broadcasting chemical spray using Hi-Fog guns.

3. Canker Elimination

Acres covered, 160; man-days, 150; trees treated, 21,600. The work was performed only during inclement weather not suitable for ribes eradication.

III. CONTROL STATUS

All ground in the present control area meets maintenance standards except 920 acres of stream type, cliffs, precipitous slopes, and snowslide areas. These will be troublesome as long as ribes seed germination continues.

Summary of ribes eradication for the present control area, 1930-1953, is as follows:

Area	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Maintenance Acres
Longmire-Silver Forest	1,300	5,700	7,000	7,810	663,000	1,100
White River	3,200	11,140	14,340	10,510	996,000	2,480
Total	4,500	16,840	21,340	18,320	1,659,000	3,580

IV. RECOMMENDATIONS

A small maintenance control crew will be necessary for the next several years to suppress ribes seedlings that continue to occur.

1. White River Unit, 1954 and 1955

A superintendent and four men should be employed to continue maintenance control work on the unstable cliffs and slopes below the Sunrise Park area.

2. Longmire-Silver Forest Unit

No work is anticipated until 1956.

BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1953

J. C. Gynn, Area Leader
C. M. Chapman, District Leader

I. DESCRIPTION AND HISTORY

The Glacier National Park blister rust control project consists of five small, scattered protection units totaling 5,140 acres. Within their boundaries are popular campgrounds, cabin camps, chalets, a large hotel, and scenic recreational areas. The Park Headquarters and Lake McDonald units located west of the Continental Divide support western white pine (Pinus monticola). East of the Continental Divide the East Glacier area peculiarly has three white pine species: Western white, limber, and whitebark (P. monticola, P. flexilis, and P. albicaulis). In the Two Medicine Lake unit limber and whitebark pines are found. In the large, remote specimen area at Oldman Lake, whitebark is the only white pine present and is the dominant tree species composing the stand.

Control measures were initiated in 1939. Ribes eradication program has reached a point where four units require only a small amount of future maintenance control work to eliminate ribes seedlings still occurring. Ribes eradication was started much later, 1946, in the Oldman Lake unit. Each year snow and other severe weather conditions have shortened the working season to approximately 6 weeks. Ribes intermingled with prostrate white pine and fir on cliffs and precipitous slopes have made the work difficult and slow. The completion of rework and future maintenance control can now be accomplished with small crews working from batching camps. Only a small amount of infection is present within control boundaries. Damage has been negligible.

II. 1953 FIELD PROGRAM

The crew was composed of a camp superintendent, checker, and 15 men. The objectives were to train the crew and perform maintenance control in the East Glacier unit until snow receded from the Oldman Lake area; then move the crew to the Oldman Lake pack camp. Because of a late spring, ribes eradication was delayed in the Oldman Lake area until July 20. All but three of the men left the job by September 2. Progress was good, but the work was not completed because of the short season.

1. Expenditures by National Park Service in calendar year 1953, $18,100.30.

2. Progress of ribes eradication - 1953

Area	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
East Glacier	300	240	5,000	.80	17
Oldman Lake	390	350	27,000	.90	69
Total	690	590	32,000	.86	46

The one-man dragline system was used on all areas except 20 acres of seedling patches treated with chemical spray using Hi-Fog guns.

The man-day requirements for working the Oldman Lake unit were reduced from 2.22 man-days per acre in 1952 to .90 man-day per acre in 1953. The most difficult part of the work was completed prior to 1953.

3. Checking and Surveys

All checking and surveys were completed as planned. A regular check was performed on the 690 acres of current year work. Previously scheduled surveys were completed on 790 additional acres to determine status of control. Future checking surveys will be scheduled as required in accordance with the maintenance program.

III. CONTROL STATUS

Recent checking data show a high degree of protection can now be maintained with a minimum of future work in all units except Oldman Lake. This area is scheduled to be on a maintenance control basis by 1956. Summary of ribes eradication 1939-1953 is as follows:

Area	Initial Worked Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Maintenance Acres
Park Headquarters	690	1,530	2,220	1,270	134,000	620
Two Medicine	710	1,530	2,240	2,720	323,000	550
Lake McDonald	1,780	3,560	5,340	3,230	165,000	1,590
East Glacier	440	1,310	1,750	3,260	326,000	240
Oldman Lake	1,520	860	2,380	4,540	463,000	560
Total	5,140	8,790	13,930	15,020	1,411,000	3,560

IV. RECOMMENDATIONS

To complete rework at Oldman Lake and perform maintenance control on all units 1954 through 1959, the following is recommended:

1954 54 man-months. Average total seasonal employees - 18

Two Medicine	10 men
Oldman Lake	6 " (batching camp)
	1 superintendent (serve both crews)
	1 checker " " "

1955 39 man-months. Average total seasonal employees - 13

Lake McDonald & Park Hdqts.	5 men
Oldman Lake	6 " (batching camp)
	1 superintendent (serve both crews)
	1 checker " " "

1956	24 man-months. Average total seasonal employees - 8		
	East Glacier & Oldman Lake	6 men 1 superintendent 1 checker	(same crew for both areas)
1957	15 man-months. Average total seasonal employees - 5		
	Maintenance control	4 men 1 superintendent	
1958	Same as 1957		
1959	" " "		

All employment based on 3-month working season.

BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1953

J. C. Gynn, Area Leader
C. M. Chapman, District Leader

I. INTRODUCTION

White pine blister rust is rapidly intensifying and spreading around Yellowstone National Park. Heavy pine infection centers have already been found adjacent to the west and north boundaries. The disease is now beginning to appear on trees northeast of the Park. Only one infected tree has been found within protection boundaries to date. In view of this situation, it is fortunate the three units comprising 13,100 acres chosen for control measures are approaching a maintenance basis.

II. 1953 FIELD PROGRAM

Ribes eradication work plans were designed to maintain control in the Mammoth unit, bring additional areas to a maintenance basis in the Mount Washburn unit, and to extend initial workings in the Mount Washburn Extension. All objectives were accomplished except in the Extension area, where work was not completed because about one-third of the working season was required for fire fighting.

The one-man dragline method was used exclusively for ribes eradication in maintenance control and rework areas in the Mammoth and Mount Washburn units. Chemical methods were used extensively in the Extension area.

1. Expenditures by National Park Service in calendar year 1953, $42,103.04

2. Organization

Two superintendents, one checker, and 40 men were employed. After training in the Mammoth unit, when snow conditions permitted, the crew was divided and moved to the Mount Washburn and Extension areas.

3. Progress on ribes eradication - 1953

The accomplishments in each control unit were as follows:

Area	Initial Worked Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
Mammoth		350	350	90	3,000	.26	9
Mt. Washburn		970	970	430	23,000	.44	24
" " Extension	990		990	1,190	443,000	1.20	447
Total	990	1,320	2,310	1,710	469,000	.74	203

4. Chemical ribes eradication, Mt. Washburn Extension, 1953

Acres of ribes concentrations treated, 270; man-days, 690; spray gallons, 21,930. The expanded program of ribes elimination by chemical achieved excellent results. Two light portable power units with 2,600 feet of main line and lateral hoses were easily moved by small spray crews from one location to another as the work progressed. Where power sprayers could not be employed along cliffs and precipitous slopes, Hi-Fog guns and knapsack units were used to good advantage. Power spraying in the remote upland areas increased efficiency, reduced man-day requirements, and will greatly facilitate completion of initial work.

5. Checking and surveys

All current year work was checked for efficiency except 270 acres chemically treated. To determine stabilization of problem areas and the degree of maintenance control, 2,080 additional acres were surveyed. Periodic maintenance control surveys will continue to be highly important until all areas become stabilized and ribes seed germination stops.

III. CONTROL STATUS

Although initial work is not completed in the new Mount Washburn Extension, all other areas are on or rapidly approaching a maintenance control basis. Summary of ribes eradication 1945-1953 for all units is as follows:

Area	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Maintenance Acres	Unworked Acres
Mammoth	1,580	2,790	4,370	2,130	219,000	1,050	
Mt. Washburn	4,690	2,630	7,320	8,700	1,218,000	3,500	10
Craig Pass	3,320	60	3,380	420	26,000	3,260	
Mt. Washburn Ext.	1,390		1,390	2,180	791,000		2,110
Total	10,980	5,480	16,460	13,430	2,254,000	7,810	2,120

IV. RECOMMENDATIONS

To finish initial ribes eradication and second working in the Mt. Washburn Extension and perform maintenance control in all areas, 1954 through 1959, the following program is recommended:

1954 111 man-months. Average total seasonal employees - 37

Mt. Washburn	10 men 1 superintendent
Mt. Washburn Extension	24 men 1 superintendent 1 checker (serve both areas)

1955 96 man-months. Average total seasonal employees - 32

Mt. Washburn	5 men
	1 superintendent
Mt. Washburn Extension	24 men
	1 superintendent
	1 checker (serve both areas)

1956 60 man-months. Average total seasonal employees - 20

Mt. Washburn Extension	18 men
	1 superintendent
	1 checker

1957 Same as 1956

1958 42 man-months. Average total seasonal employees - 14

Maintenance control	12 men
	1 superintendent
	1 checker

1959 Same as 1958

1954-1959 - Mammoth and Craig Pass areas maintained by crews listed above before snow conditions permit working in the Mt. Washburn units.

All employment based on a 3-month working season.

Mount Washburn Extension Unit: Treating Ribes lacustre along cliff edge with Hi-Fog gun. The chemical fog envelops the bush wetting all leaf and stem surfaces.

Mount Washburn Extension Unit: Portable power sprayer weighing 55 pounds used in remote and rugged areas.

Mount Washburn Extension Unit: Bean Cutler portable power sprayer. Highly efficient but difficult to move in steep, rugged terrain. Used for spraying ribes concentrations along streams and adjacent upland.

BLISTER RUST CONTROL, ROCKY MOUNTAIN NATIONAL PARK, 1953

J. C. Gynn, Area Leader
C. M. Chapman, District Leader

I. DESCRIPTION AND HISTORY

The Longs Peak-Estes Cone white pine blister rust control unit comprises 6,100 acres supporting one of the best stands of limber pine (Pinus flexilis) in northern Colorado. The area is of particular aesthetic value. It contains picturesque Estes Cone, Battle Mountain, Mount Lady Washington, and Longs Peak is immediately adjacent. Highly used trails to these beautiful peaks transect the unit. Longs Peak campground located within the control boundaries is the most popular starting point for hikers and mountaineers in this area.

Ribes eradication was started in 1950. Aided by new and more effective chemical sprays and equipment, all initial work was completed the following year, requiring 1,246 less man-days than originally estimated. The second working of initially heavy ribes concentrations was started in 1952 with a reduced crew and completed in 1953. Maintenance control for the entire protection unit can now be done with a very small crew.

II. 1953 FIELD PROGRAM

All second working was completed in the north portion of the unit as planned. In addition, future man-day requirements were reduced by performing a considerable amount of maintenance control ahead of schedule in the south portion.

1. Expenditures by National Park Service in calendar year 1953, $24,236.04

2. Organization

One superintendent, a checker, and 22 men were employed for a 3-month period starting June 15. Men were transported by truck from the Park Utility area to the most accessible portions of the work. In order to conserve energy and eliminate walking time to high, remote areas, a six-man batching pack camp was installed at 11,000 feet elevation on the north side of Battle Mountain. Crews were rotated every 2 weeks.

3. Progress on ribes eradication, 1953

Area	Total Worked Acres	Man-Days	Ribes	Per Acre	
				Man-Days	Ribes
Longs Peak-Estes Cone	1,810	1,130	17,000	.62	9

Because of the efficiency of chemical methods on initial upland work in 1950 and 1951, additional chemical treatment was not required in the upland. Using the one-man dragline system the few small, scattered bushes and resprouts were quickly found and hand pulled. Ribes remaining in the stream type were treated chemically using knapsack units and Hi-Fog guns.

4. Checking and surveys

All 1953 work was checked for efficiency to determine location of current mop-up work required. An additional 2,990 acres were intensively surveyed using the checker flanker method to determine amount of maintenance control work needed.

III. CONTROL STATUS

Intensive recent surveys show 5,000 acres meeting maintenance standards. The other 1,100 acres would be in the maintenance category except for ribes seedlings occurring in scattered spots. Ribes seed germination appears to be rapidly diminishing as grass and other vegetation are forming new cover on ground disturbed by ribes eradication activities. The timeliness of this maintenance control situation is fortunate as the disease was found on ribes just north of the Colorado border near Laramie, Wyoming, in 1952.

Summary of ribes eradication 1950-1953 is as follows:

Area	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Maintenance Acres
Longs Peak-Estes Cone	6,100	3,540	9,640	6,790	381,000	5,000

IV. RECOMMENDATIONS

In order to bring all portions of the unit to the protection standards required and to maintain control from 1954 through 1956, the following program is recommended for the Longs Peak-Estes Cone area:

1954 18 man-months. Average total seasonal employees - 6 (3-month season)

1955 Same as 1954

1956 " " 1954

The crew will consist of five men and a superintendent. The superintendent will also do the checking.

DEVELOPMENT AND IMPROVEMENT OF BLISTER RUST CONTROL METHODS
PROJECT STATUS AND HIGHLIGHTS OF 1953

H. R. Offord, Project Leader

Project Status

The need for continuous study of the costs and effectiveness of control methods has been recognized by blister rust control leaders since the inception of control work in the Far West 30 years ago. Since 1925, project status has been accorded the activities of the personnel assigned to control investigations in the Western States (California, Oregon, Washington, Idaho, Montana, Wyoming, and Colorado).

The general purpose of blister rust control investigations (known as the D.& I. Project) has been to develop and demonstrate more effective and economic methods of blister rust control. To these ends immediate work objectives have been: (1) the improvement of chemical, physical, and mechanical methods of ribes eradication including the development and adaptation of special equipment needed for this work, (2) the study of ribes ecology in relation to the status of rust control and to cutting and management practices in western white pine and sugar pine types, (3) field studies of the disease in relation to (a) control standards (number of ribes per acre and width of protective strip) and (b) the appraisal of pine losses caused by the rust; this phase of the work has also included development of scouting and disease survey methods, (4) participation in the cooperative project for the development and testing of rust-resistant white pines, (5) testing of systemic and contact fungicides for the protection of nursery stock, young-age-class plantations or stands of natural regeneration; also testing of fungicides for killing branch and stem cankers on crop or ornamental pines.

In the conduct of the five principal lines of work just noted, the D.& I. personnel have been aided by and have worked closely with Blister Rust Control Project Leaders and their supervisors and other control specialists in the Bureau of Entomology and Plant Quarantine, and with other Federal and State research agencies, chiefly the U. S. Forest Service, Bureau of Plant Industry, Soils and Agricultural Engineering, the University of California, and the University of Idaho. The findings of the past 30 years' work of D.& I. personnel are contained in 30 annual reports, 150 numbered project reports (known as Serial Reports), 4 public service patents, and 41 publications in U.S.D.A. and outside technical journals. For the fiscal year 1954, the D.& I. project in Entomology and Plant Quarantine, consisted of three project technicians in Spokane, Washington, three in Berkeley and Oakland, plus a project leader and secretary-clerk in Berkeley.

The investigations project has already accomplished much of direct value to control operations, but a great deal more needs to be done. The need for obtaining maximum volume of white pines from designated control areas will call for continuous study and critical appraisal first, of pine management techniques; second, of methods and costs of ribes suppression in relation to approved management methods; and third, of the anticipated pine losses from rust. Improvements and changes in white pine management can be expected to involve appropriate changes in blister rust control methods. The breeding and

propagation of white pines with improved resistance to blister rust or improved adaptation to the drier or less hazardous portions of the white pine sites offers great possibilities for better management of the species. This development is necessarily a long-term one which should continue to receive adequate support. Studies on the ecology of the rust and the climatic factors affecting its virulence and distance of spread should have high priority in future research and control investigations in the western white pine and sugar pine regions. The application of this research to evaluation of the status of control and to control standards is primary concern of blister rust control specialists. If the rust hazard could be accurately predicted, control costs could be sharply reduced in some areas, and losses of white pine minimized in others. Studies of effect of local climate on rust spread and of the aerodynamics of blister rust spores, especially the fall-out and deposit of the blister rust sporidia (pine-infecting spores), would provide information that is urgently needed by control supervisors.

There is a great need to improve low cost and rapid methods of suppressing ribes by broadcast application of herbicides from aircraft and ground rigs. When it is realized that the economically important ribes of western white pine and sugar pine forests can, in actual fact, be killed by less than one dollar's worth of chemical per acre, there is every reason to expect significant improvements in these methods of direct ribes suppression. All that is needed to make such low cost work possible is a fully translocatable herbicide. At present we need complete coverage of mature ribes to be sure of kill with 2,4-D or 2,4,5-T. A tremendous amount of research on new herbicides is being done in this country, as well as abroad. Results of this work should be closely followed and the necessary field testing of new herbicides promptly undertaken.

New fungicides, especially those having systemic properties, should be noted and the more promising ones tested under field conditions. Such chemicals could contribute to the resistance of selected strains of white pine or to the short-term protection of nursery stock and plantations where ribes suppression has not reached safe levels. The use of fungicides as a substitute for cutting cankers from crop trees also holds promise of lowering control costs.

In the overall appraisal of the needs and objectives of blister rust control investigations, the broader picture of forest pest control should be kept clearly in mind. In dealing with managed stands, especially young stands established by planting, direct seeding, or by cutting, it would seem logical to employ as many single package methods as possible in scheduling protection work. Thus ribes and other undesirable vegetation could be scheduled for suppression at the time best suited for pest control and for vigorous growth of the trees being established. Also, suitable mixtures of fungicides, and fertilizers if needed, insecticides, or any combination of these protectants with herbicides might well be applied in a single operation or in the fewest possible treatments. The ultimate objective of blister rust and related pest control work must always be to serve the best interests of productive and effective use of forest land.

Highlights of 1953

Control investigations relative to the improvement of chemical methods and the adaptation of equipment needed for this chemical work, the development of rust-resistant western white pine, the maintenance of plots and studies on ribes ecology and timber management, and the testing of fungicides for the protection of nursery stock were continued by Messrs. Moss, Bingham, and Breakey in accordance with approved project work plans.

Noteworthy results of 1952 chemical plots were: (1) Of the six 2,4,5-T herbicides replicated four times between July 1 and September 3 in two areas (St. Joe N.F. and Kaniksu N.F.), the highest mean bush kill (98 percent) was obtained with a high emulsifier formulation of the butoxyethanol ester. (2) Kill obtained from the August 14 tests was lower for five out of six of the 2,4,5-T formulations than that resulting from the September 3 tests. (A similar reaction in seasonal response of _Ribes_ sp. to 2,4-D and 2,4,5-T has been noted in other regions.) (3) The importance of using adequate volume of spray solution to insure thorough wetting of tops and drenching of soil about the root-crown was confirmed by results of milacre plot tests on _R. lacustre_. When the same weight of 2,4,5-T acid was used in 1-gallon and in 2-gallon treatments, the larger volume provided significantly better kill in six out of seven tests. (4) Replicated late season tests (8/28, 9/4, 9/11, 9/18, 9/25) of aqueous 2,4,5-T with and without special wetting agents showed that bush kill from the several formulations was generally comparable until ribes leaves were damaged by frost. (5) New formulations of low-volatile esters of 2,4,5-T are not improved by adding the oil-like penetrants during the active part of the growing season, though the use of previously recommended summer oil may continue to serve a useful purpose as a marker; in late summer when ribes have commenced to harden off there was somewhat better kill from spray solutions that contained 1 percent summer oil or 0.25 percent Multifilm L.

Several new herbicides and new mixtures of 2,4,5-T and other toxicants were tested in 1953 but these cannot be evaluated until 1954.

Development and adaptation of spray equipment included shop design and field testing of a portable sprayer. Ten of these units were assembled and used in field work on the Kaniksu, Coeur d'Alene, and Kootenai National Forests in Idaho and Montana, on the Plumas N.F. in California, and on Yellowstone and Sequoia National Parks. Performance records of pumps and engines showed that 2½ h.p. 4-cycle engine and a rotary force pump equipped with impellers or rollers that withstand oil 2,4,5-T formulations will provide a satisfactory field unit to supply two or three nozzlemen with adequate spray solution at 150 p.s.i. Other accomplishments were compilation of a 34-page manual on power sprayer equipment, and assistance to operations in securing collapsible canvas tanks, truck-mounted tanks, and completion of hose and coupling assemblies for large-scale power spraying.

Results of 1952 tests in treating blister rust cankers with chemicals showed that 2,4,5-T at 500 ppm and 2,4,5-T at 500 ppm plus Acti-dione at 20 ppm killed 73 and 89 percent, respectively, of the branch cankers treated. These kills can be compared with 9 percent mortality of branch cankers on untreated or control trees. Tests of several new formulations were made during 1953 which were designed to increase absorption of the principal toxicant.

During 1953, the fourth year of cooperative work in the development of rust-resistant white pine by the Forest Service, Bureau of Plant Industry, Soils, and Agricultural Engineering, and the Bureau of Entomology and Plant Quarantine, major activities were: grafting for replacement of material lost on the out-planting plots (275 made in the greenhouse at Spokane, and 236 in the field), grafting to induce early flower induction (a) by approach grafts (165 with 2- to 6-year-old scions on 15- to 35-year-old trees) and (b) by interspecific and intergeneric grafts (200 trials from which most of the interspecific but only a few intergeneric crosses were surviving in November 1953), additional pollination chiefly to satisfy the needs of the vigor and quality testing program (91 intra- and 6 interspecific), nursery production of progeny from controlled pollination, seed collection and extraction, and the first large-scale blister rust inoculations (Sept. 21 to Oct. 2) of F_1 and control progeny in the Spokane nursery. About 2 months were spent in preparing three progeny outplanting sites in Randolph Creek, Lolo N.F., and in Elk Creek and at Fernwood, St. Joe N.F., the latter area being the replacement for Crystal Creek which had to be abandoned. No intensive selection work was undertaken in 1953.

To date, 72 rust-resistant selections of western white pine have been made, of which 61 trees are cankerless and 11 have 1 or 2 cankers apiece. Germination (48.8%) of seed from 1951 pollinations (planted spring of 1953) was below that (94.8%) of seed from 1950 pollinations (planted spring of 1952) for reasons not yet fully understood. As in past years, germination of seed from inter-specific crosses (hybrid) surpassed that of seed from intraspecific crosses both in percent of seed germinating and in rate at which seedlings develop.

At the Spokane nursery, preliminary trials were made of Fermate, copper-8-quinolinolate and Rosin amine D pentachlorophenate as contact fungicides for the protection of nursery stock subsequently given 72 hours' exposure to the rust in Dr. Kimmey's inoculation chambers. Results of these tests will be known in 1 to 3 years.

Rust intensification and spread have been light in the Inland Empire region for 1952 and 1953, thus postponing the need for intensive work on the Elk River status of control area.

FISCAL YEAR ALLOTMENTS FROM WHICH EXPENDITURES
WERE MADE BY THE DEVELOPMENT AND IMPROVEMENT PROJECT
DURING THE CALENDAR YEAR 1953

Federal Funds

Fiscal Year 1953	Fiscal Year 1954
$53,600	$52,700

Expenditures by the Development and
Improvement Project for the Calendar Year 1953

Fiscal Year 1953 1/1 to 6/30/53	Fiscal Year 1954 7/1 to 12/31/53	Total
$25,346	$27,259	$52,605*

*Expenditure distribution by states

California	$21,042
Idaho	15,781
Montana	2,630
Oregon	5,261
Washington	7,891
Total	$52,605

DEVELOPMENT AND IMPROVEMENT OF CONTROL METHODS FOR RIBES ERADICATION

Virgil D. Moss, Agriculturist

RESULTS OF 1952 FIELD TESTS WITH HERBICIDES

Results from types of 2,4-D and 2,4,5-T products

Eight plant growth-regulating products were applied as foliage spray to *Ribes lacustre* and *R. viscosissimum* (table I). In previous tests these ribes species have been semitolerant to resistant to 2,4-D. The percent bush kill of three products fell below 75. One of these was straight 2,4-D; the other was a mixture of 2,4-D and 2,4,5-T. The third was a tetrahydrofurfural ester of 2,4,5-T (Estercide 44). This herbicide produced a thick, gummy residue when added to water. Its low percent bush kill is believed to be chiefly due to poor formulation. By comparison, the other tetrahydrofurfural ester of 2,4,5-T (Lo-Vol 4) was the most effective during the summer of the five products killing better than 75% of the ribes. The highest mean percent bush kill throughout the season was attained by a butoxyethanol ester of 2,4,5-T (ACP-L-329 High Emulsifier). Results were fairly comparable among propylene glycol butyl ether ester (Esteron 245), butoxyethanol ester (Weedone 2,4,5-T), and emulsifiable acid of 2,4,5-T (ACP-L-120). About mid-August, after fruiting when growth commences to slow down, there is a short period when ribes are more difficult to kill than later when adjustments are made for a slower rate of metabolism. With five of the six products the percent bush kill was higher from spray treatment on September 3 than on August 14.

Relation of bush kill to volume of spray applied

Many factors influence the effectiveness of 2,4,5-T on ribes, but none is more important than applying enough spray volume to properly treat each bush. Increasing the recommended dosage of 2,4,5-T will not compensate for failure to thoroughly drench ribes crowns and to wet stems, leaves, and tips of all growing shoots to the point of dripping. Results of tests made on *R. lacustre* with 1 gallon and 2 gallons per milacre are shown in table II. Each milacre received the identical total acid equivalent of 2,4,5-T. Concentration for plots with 1 gallon of solution was 2,000 ppm a.e., and for plots with 2 gallons, 1,000 ppm a.e. Discarding straight 2,4-D (ACP-L-129 High Emulsifier) because of poor results on *R. lacustre*, the percent bush kill for 1 gallon was equalled or significantly better for 2 gallons in six of the seven cases. This demonstrates the importance of applying enough spray to drench crowns and wet foliage to the point of dripping. In crown drenching, enough solution should be applied to barely puddle the soil surrounding the ribes crown. Where bushes are growing on a slope, crowns should be drenched on the uphill side of the ribes as its roots will be growing back into the hill. Crowns of large ribes should be drenched both on the uphill and downhill side of the bush. With variable sizes and growth habits of ribes, it is not possible to recommend a specific volume of spray for a given size class and type of bush. The correct spraying technique must be developed by training and experience.

Effectiveness of aqueous spray on ribes in the fall

With a slowing down of metabolism in the fall, ribes become increasingly difficult to kill with aqueous foliage sprays of 2,4,5-T. To determine just how late this spray is effective, plots were established on R. lacustre at weekly intervals beginning August 28 and ending September 25. On each of five dates (table III), six plots were sprayed. One consisted of 2,4,5-T in water without an adjuvant. A sticker-spreader-penetrant was added to the other five plots. Each received the identical dosage of 2,4,5-T (2,500 ppm a.e.). Volume of spray applied each plot was 1½ gallons.

The percent bush kill did not vary greatly into early September. Some solutions containing an adjuvant were effective through September 11. The following week all solutions took a tremendous drop in effectiveness. Between September 11 and September 18 the first killing frost occurred. Temperature dropped enough to down ferns and blacken the other succulent vegetation. On the basis of these tests on R. lacustre, the summer-type aqueous spray of 2,4,5-T would not be effective after the first killing frost.

Value of adjuvants in aqueous spray of 2,4,5-T

Volatile or short-chain esters of 2,4,5-T (early products) are more effective on ribes when the aqueous spray contains an adjuvant. The best has been summer oil emulsion (Shell's Neutrol Heavy Emulsion). It also has merit as a marker. The recent trend toward producing low volatile esters of 2,4,5-T raises the question as to whether an adjuvant is needed as these new formulations contain more emulsifier and sticker-spreader-penetrant materials. To answer this question, tests were made to compare the effectiveness of aqueous solutions of 2,4,5-T with and without various adjuvants. A butoxyethanol ester was applied at a dosage of 2,000 ppm a.e. Volume of spray was 1½ gallons per milacre. Plots were 2 square milacres in size. Spray was applied August 19.

Adjuvant, %	Bush Kill, %
None	86
Summer oil emulsion, 1	92
Multi-film L, 1/10 of 1	87
Triton X-45, " " "	89
Triton X-100, " " "	83
Tween #20, " " "	81

These and results in table III show no significant advantage in adding a sticker-spreader-penetrant to aqueous solutions of low volatile esters during summer when ribes are actively growing. Summer oil emulsion, however, may want to be used as a marker. After mid-August when ribes commence to develop tolerance to aqueous foliage spray, some improvement in effectiveness of treatment can be made by adding a sticker-spreader-penetrant. This should be either 1% summer oil emulsion, or ¼ of 1% Multifilm L.

TABLE I

EFFECTIVENESS OF SEVERAL TYPES OF 2,4-D AND 2,4,5-T PRODUCTS AT DOSAGES OF 2,000 PPM A.E. IN REPLICATED TESTS ON RIBES LACUSTRE AND R. VISCOSISSIMUM IN THE KANIKSU, ST. JOE, AND COEUR D'ALENE NATIONAL FORESTS

Trade Name or Code Number for the Product	Type of Ester[1]	Percent Ribes Killed Date of Treatment 7/1	7/30	8/14	9/3	Mean
ACP-L-129 (High emulsifier)	butoxy ethanol 2,4-D	12	0	8		7
Stull's Brush Killer #3	isopropyl 2,4-D and 2,4,5-T	62	78	79		73
ACP-L-120	emulsifiable acid	92	100	77	100	92
ACP-L-329 (High emulsifier)	butoxy ethanol	100	100	92	100	98
Dow Esteron 245	propylene glycol butyl ether	100	86	82	93	90
ACP Weedone 2,4,5-T	butoxy ethanol	100	100	86	95	95
Pittsburgh Brush Killer Lo-Vol 4	tetrahydrofurfural	100	100	100	61	90
Cal-Spray Estercide 44	tetrahydrofurfural	75	44	14	58	48

[1] 2,4,5-T and an ester unless otherwise noted.

TABLE II

RELATION OF SPRAY VOLUME TO BUSH KILL FOR SEVERAL TYPES OF 2,4-D AND 2,4,5-T PRODUCTS ON RIBES LACUSTRE IN PLOTS RECEIVING AN IDENTICAL AMOUNT OF ACID (2,000 PPM) IN THE ST. JOE NATIONAL FOREST

Trade Name or Code Number for the Product	Type of Ester[1/]	Percent Ribes Killed, Spray Applied Per Milacre: 1 Gallon	2 Gallons
ACP-L-129 (High emulsifier)	butoxy ethanol 2,4-D	0	0
Stull's Brush Killer #3	isopropyl 2,4-D and 2,4,5-T	100	78
ACP-L-120	emulsifiable acid	38	100
ACP-L-329 (High emulsifier)	butoxy ethanol	69	100
Dow Esteron 245	propylene glycol butyl ether	67	86
Weedone 2,4,5-T	butoxy ethanol	100	100
Pittsburgh Brush Killer Lo-Vol 4	tetrahydrafurfural	30	100
Cal-Spray Estercide T44	tetrahydrofurfural	0	44

1/ 2,4,5-T and an ester unless otherwise noted.

TABLE III

EFFECTIVENESS OF AQUEOUS SOLUTIONS OF 2,4,5-T AT DOSAGE OF 2,500 PPM A.E. IN FALL TREATMENTS REPLICATED AT WEEKLY INTERVALS ON RIBES LACUSTRE IN THE COEUR D'ALENE NATIONAL FOREST

Product, Type Ester, and Acid Equivalent 2,4,5-T	Sticker-Spreader-Penetrant	Volume Percent	8/28	9/4	9/11	9/18	9/25	Mean
Pittsburgh Coke & Chemical Co.	None		87	87	67	18	12	54
Ester: tetrahydrafurfural	Summer oil emulsion	.10	73	90	75	22	37	59
Ppm: 2,500	Tween #20	.04	75	100	91	10	22	60
	Tween #20	.08	86	70	70	14	14	51
	Multi-Film L	.04	100	94	100	30	30	71
	Multi-Film L	.08	85	87	80	33	22	61

(Date columns: Percent Ribes Killed, Date of Treatment)

CHEMICAL TESTS ON RIBES IN 1953

Comparisons of four volumes of spray on plots receiving the same amount of 2,4,5-T acid

This is a continuation of tests to determine whether costs of ribes suppression can be reduced by lowering (on a per acre basis) either the volume of diluent or the weight of 2,4,5-T. The best opportunity appears in lowering weight of 2,4,5-T than in reducing volume of spray applied per acre for the following reasons: By and large, the control operations in averaging around 300 gallons of spray per acre are applying about the volume necessary to properly treat ribes. In a methods study of 1950, areas of seedling ribes were broadcast sprayed at an average of 276 gallons per acre and areas of mature ribes at an average of 297 gallons per acre. By comparison, the control operations are not applying wasteful amounts of solution. Any attempt on conserving spray can seriously jeopardize results of treatment by reducing the volume needed to thoroughly drench crowns and wet foliage to the point of dripping. At the beginning of the work season, spraymen usually apply excessive amounts to ribes and to ground barren of woody-plants, but as their training continues and as they acquire experience in spraying, the gallonages per acre level off to about the recommended amounts for broadcast treatment of ribes. Finally, with better products of 2,4,5-T now available, tests have indicated that the weight of 2,4,5-T per acre possibly can be lowered for spray treatment by the control operations.

Tests were made of four volumes of spray with a uniform dosage of 2,4,5-T acid per plot. This was done to further study the relationship between volume of spray and percent bush kill. The gallonage of spray applied per milacre was 1, 1½, 3, and 6. Ribes species were lacustre and viscosissimum. Plots were replicated three times during the season: Santa Creek, St. Joe National Forest on June 11; and Honey Creek, Coeur d'Alene National Forest, on July 1 and August 10.

New chemicals and types of products

PMU (phenyl dimethyl urea): This chemical differs from 2,4,5-T by being a soil sterilizer or contact herbicide. In tests of aqueous foliage spray, PMU (80% wettable powder) was applied at concentrations of 1,000, 2,000, 3,000, and 4,000 ppm. Volume of spray was 1½ gallons per milacre. Plots of R. viscosissimum and R. lacustre were replicated three times during the season: Santa Creek, St. Joe National Forest, on June 11; and Honey Creek, Coeur d'Alene National Forest, on July 1 and August 10.

CMU (chlorophenyl dimethyl urea): CMU dry powder was applied on soil about the base of plants in tests on R. lacustre and R. viscosissimum. Dosage in pounds per acre was estimated as 32 (CMU 100%). Another test included the scattering of CMU (25%) pellets on soil around the root-crown of ribes. These were applied at a dosage of approximately 32 lbs. CMU (100%) per acre. Plots were treated June 17-18 in the Coeur d'Alene National Forest.

2,5-D and 3,4-D: These two plant growth-regulating compounds have the same physical structure as 2,4-D except for the benzene ring position of chlorine. One plot each of an aqueous spray was established July 2 on R. lacustre in Honey Creek, Coeur d'Alene National Forest. Dosage rate was 2,000 ppm a.e. Volume was 1½ gallons per milacre.

Isooctyl ester of 2,4,5-T: This is a low volatile ester of the Pittsburgh Chemical & Coke Company. With the practice of testing all herbicides in the laboratory and field before approving their use by the control operations, this was a routine study of another low-volatile ester of 2,4,5-T. Dosages of 1,000 and 2,000 ppm a.e. 2,4,5-T were applied at a uniform volume of 1½ gallons per milacre. Treatments were replicated three times during the season: Santa Creek, St. Joe National Forest, on June 11; and Honey Creek, Coeur d'Alene National Forest, on July 6 and August 11. Tests were made to R. lacustre and R. viscosissimum.

Combination spray of maleic hydrazide and 2,4,5-T: Maleic hydrazide (MH) is a plant growth-inhibitor in contrast to 2,4,5-T which is a plant growth-stimulator. The purpose in testing MH (58% diethanolamine salt) was to determine whether it would inhibit crown sprouting of R. lacustre and R. viscosissimum when they were treated with 2,4,5-T at a dosage that was expected to kill from 50 to 75% of the bushes. 2,4,5-T was included in the sprays used on five plots at a concentration of 1,000 ppm a.e. The first plot was sprayed with an aqueous solution of 2,4,5-T. The other four plots were treated with a mixture of 2,4,5-T and MH, the latter chemical being used in increasing dosages of 250 ppm. The last plot in the series received equal amounts (1,000 ppm) of each chemical. Treatments were replicated three times during the season: Santa Creek, St. Joe National Forest, on June 12; and Honey Creek, Coeur d'Alene National Forest, on July 6 and August 11.

Chloro IPC (Isopropyl-N-(3-chlorophenyl) carbamate): This is a herbicide primarily used to kill grasses. Purpose in testing it was to determine its effectiveness in controlling grasses, sedges, and rushes on prescribed controlled burns before planting, and on young plantations where these grass and grass-like plants interfere with the survival and growth of white pine. Another reason was to determine (for stream type) whether the control of these plants with chloro IPC would increase the effectiveness of mopping up R. inerme and R. lacustre on second working. The searching and chemical treatment of ribes in stream type are difficult when they are screened by grasses and grass-like plants.

Chloro IPC as an emulsion containing 3.42 lbs. of acid per gallon was furnished for these studies by the Columbia-Southern Chemical Corporation. In the Kaniksu National Forest, tests were made on August 19 in Lamb Creek and August 20 in the Camp #15 Road plantation. In Lamb Creek, 10 plots received the same amount of 2,4,5-T acid (.002) to kill R. inerme with Chloro IPC added for the control of grass and grass-like plants. Volume of spray solution was varied by treating five plots at the rate of 1 gallon per milacre and five at the rate of 2 gallons per milacre. The control plots were sprayed with 1 gallon and 2 gallons of the aqueous solution of 2,4,5-T. Thereafter, Chloro IPC was added at rates of 10, 20, 30, and 40 lbs. per acre to the aqueous solution of 2,4,5-T for the 1 gallon and 2 gallon volume rates.

In the Camp #15 Road plantation, Kaniksu National Forest (1949 planting), similar treatments were made to study the control of grass and grass-like plants, and to check the effect of these sprays on white pine. The treated plots were established with a planted white pine in the center of the mil-acre. Close by, a check plot was staked to compare the survival and growth of white pine. In pairing these tests, trees were selected of comparable height-growth and competition from grass and grass-like plants. In spraying plots, solution was applied broadcast over all vegetation including the planted white pine in the center of the milacre.

In the Coeur d'Alene National Forest, Chloro IPC plots were established in Honey Creek (stream bottom) on September 3. These treatments differed from the Kaniksu studies in that Chloro IPC was tested separately and in combination with 2,4,5-T for killing R. lacustre as well as for the control of grass and grass-like plants. Nine plots were established: four of Chloro IPC at rates of 10, 20, 30, and 40 lbs. per acre; four of Chloro IPC at similar rates but in combination with 2,4,5-T (2,000 ppm a.e.), and a ninth (check) plot of 2,4,5-T. Grasses, sedges, and rushes were collected for identification from the plots. These will be reported in 1954 after determining the effect of spray on various species.

Water-oil emulsion of 2,4,5-T for foliage treatment of ribes in fall: In order to develop an effective solution for fall work when ribes are approaching winter dormancy, tests were made of a water-oil emulsion of 2,4,5-T in the Coeur d'Alene National Forest. This solution consisted of 1 part stove oil, 9 parts water, and 2,000 ppm a.e. 2,4,5-T. The proportion of 1 to 9 when well emulsified produces a spray having all the favorable characteristics of a straight oil solution, namely, ease in spreading, sticking, and penetrating, and a low rate of evaporation. Stove oil in this solution also was found to be a very good marker. Because of high costs, a straight stove oil or Diesel oil solution, although highly effective for basal-stem treatment, is not considered practical for large volume work. The water and stove oil were emulsified by first mixing 2,4,5-T containing an emulsifier with stove oil. Water was then jet-propelled through a Pecan gun nozzle (stream opening) into the mixture of stove oil and 2,4,5-T placed in a 28-gallon oil drum. Mr. Fred J. Heinrich, BEPQ Technical Supervisor, Coeur d'Alene National Forest, assisted in the establishment of these plots.

One test was made to compare the effectiveness of the summer aqueous spray of 2,4,5-T (2,000 ppm a.e.) to which 1% oil emulsion was added with a water-oil (stove) emulsion of 2,4,5-T. Low altitude plots (R. lacustre) were established in Iron Creek on cutover and high altitude plots on cutover in the West Fork of Hudlow Creek. Ribes lacustre and R. viscosissimum were numerous on the Hudlow Creek plots. Tests were established at two altitudes to study the factors of rapid defoliation and slower metabolism which are believed to affect bush kill at this time of the year. Ribes in Iron and Hudlow Creeks varied from 10 to 15 years in age. Plots were 1/20 acre in size, ½ chain wide by 1 chain long. Volume of spray applied each plot was 25 gallons. Treatments were replicated three times during the fall: September 4, 15, and 29. A Briggs & Stratton portable power sprayer was used to pump solution through ¼ inch lateral hose. Solution was applied broadcast with the Pecan gun nozzle.

Another test was made to determine the effectiveness of a water-oil emulsion of 2,4,5-T in foliage spraying seedling ribes on a recent burn by (1) crown drenching ribes 1 foot or higher or containing 1 foot or more live stem as against (2) crown drenching all ribes regardless of size. Other than crown drenching ribes, spray was applied broadcast to the plot areas. An advantage in fall spraying is that ribes in being the last to lose their leaves are easily found when all other vegetation has been frozen down or defoliated.

Three plots (1/10 acre) were established in the South Fork of Potter Creek, an area prescribed broadcast burned the fall of 1951. Two plots contained R. lacustre seedlings, and a third, R. viscosissimum. All were sprayed with the same type of solution, a water-oil emulsion of 2,4,5-T consisting of 1 part stove oil, 9 parts water, and 2,000 ppm a.e. 2,4,5-T. Ribes 1 foot or higher or containing 1 foot or more live stem were crown drenched in one R. lacustre plot. This required the equivalent of 172 gallons of spray per acre. On the other R. lacustre plot, ribes regardless of size were crown drenched. This required the equivalent of 168 gallons of spray per acre. The third plot was treated to represent what was considered the most practical type of application, namely, crown drenching ribes 1 foot or higher or containing 1 foot or more live stem, and smaller seedlings that did not involve search. Crown drenching of smaller plants was accomplished by holding the nozzle close to the base of the seedling for a longer period than in regular broadcast spraying. In crown drenching larger seedlings, nozzle was pressed to the soil surface on the uphill side of the ribes crown. The three plots were sprayed October 14.

CHEMICAL TREATMENT OF INFECTED WHITE PINE

Results of tests in 1952

Aqueous solutions of chemicals tested separately and in combination were applied as foliage spray to western white pine infected with blister rust in Solitaire Creek, Coeur d'Alene National Forest. Type and dosage of chemical and the percent of branch cankers killed follow:

Chemical	Ppm	Branch Cankers Killed, %
Check trees (untreated)		9
alpha-naphthaleneacetic acid	100	44
	300	52
	500	63
alpha-naththaleneacetic acid + acti-dione	100+20	42
	300+20	46
	500+20	68
alpha-naphthaleneacetic acid + 2,4,5-T	300+1,000	54
alpha-naphthaleneacetic acid + 2,4,5-T & acti-dione	300+1,000+20	62
2,4,6-T	500	50
2,4,6-T + acti-dione	500+20	73
2,4,6-T + alpha-naphthalene-acetic acid	500+100	42
2,4,5-T	500	73
2,4,5-T + acti-dione	500+20	89
2,4,5-T + alpha-naphthalene-acetic acid	500+100	65

Chemicals applied as foliage spray in 1953

To increase absorption and penetration of chemical, acti-dione, and a new antibiotic "endomycin," were applied in Sovaspray 100, a nontoxic horticultural oil of the Socony Vacuum Oil Company. A third chemical, Chloro IPC (isopropyl-N-(3-chlorophenyl) carbamate in aqueous solution, was tested to determine its toxicity to cankers and infected and healthy branches. Spray was applied to the foliage of white pine with a Sure Shot Sprayer. Dates of treatment were: acti-dione, August 25; endomycin, September 1; and chloro IPC, September 2. Each dosage (ppm) of chemical was applied to three trees.

Acti-dione	Endomycin	Chloro IPC
2.5	2.5	2,500
5.0	5.0	5,000
10.0	10.0	10,000
20.0	20.0	20,000
40.0	40.0	40,000

Chemical treatment of excised stem cankers

Blister rust cankers were excised by roughly following the line of discoloration between infected and healthy bark from stems of young pole trees and a fungicide applied to the cut portions. Object in developing a fungicide for treatment of excised cankers is to kill remnants of mycelium in the surrounding bark tissue to prevent further growth of the rust. Cankers were excised with a hatchet and knife. Solution was applied with a small paint brush to cut surfaces and the bark surrounding the excised stem canker. Acti-dione and endomycin were applied in Sovaspray 100 at dosages of 150, 300, and 600 ppm. Calcium sulfamate (5%) and Rosin Amine D-pentachlorophenate (18%) were tested in formulas as follows:

Form. A

10 grs. calcium sulfamate
10 mls. glycerol
126 mls. isopropyl alcohol
14 mls. pine oil
10 mls. Tween #20

Form. B

50 grs. calcium sulfamate
200 mls. water
600 mls. isopropyl alcohol
150 mls. glycerol
50 mls. Tween #20

Form. C

10 grs. calcium sulfamate
100 mls. water
80 mls. isopropyl alcohol
10 mls. ionic (Sharples)
10 mls. glycerol

Rosin Amine D-pentachlorophenate

15 grs. RADP
41 mls. toluene
41 mls. terpinolene

RIBES ECOLOGY IN RELATION TO RUST CONTROL AND WHITE PINE MANAGEMENT

Results of 15 years' study in ribes ecology and timber management practices have been summarized in a publication by Moss and Wellner entitled "Aiding Blister Rust Control by Silvicultural Measures in the Western White Pine Type," USDA Circular No. 919 September 1953. Copies of this bulletin are available in Spokane at the Office of Blister Rust Control, or from the Northern Rocky Mountain Forest and Range Experiment Station at Spokane and Missoula. Current work in ribes ecology and related studies is given in the following paragraphs.

Occurrence of ribes seedlings after chemical spray treatment

Areas sprayed with 2,4,5-T by the control operations are being studied to determine the relation of chemical treatment to (1) germination and survival of ribes seedlings, (2) reasons for and character of growth of ribes surviving treatment, and (3) extent of systemic injury to white pine and other types of vegetation. With only 3 years' spraying enough time has not elapsed to fully ascertain the germination and survival of ribes. However, it is becoming apparent that the occurrence of ribes seedlings after spraying will relate to age of area when sprayed after logging and/or prescribed control burning, volume and disposition of slash, density and types of vegetation, ribes species, whether old or new seed, date of treatment, and site and exposure. On the basis of observations to date, numbers of ribes seedlings germinating are low and mortality high. White pine losses are largely confined to seedlings infected with blister rust, seedlings of low vigor in heavy shade and in severe competition, and seedlings growing on severe sites. Of the conifers, western red cedar, Englemann spruce, and white pine are the least affected by 2,4,5-T spray.

Timing of initial spray treatment of ribes seedlings on cutover lands and control burns

Initial spray treatment of recently disturbed lands must be timed to follow in so far as possible the completion of ribes germination and to precede the production of new seed by the seedlings. Studies throughout the region show greater effectiveness of treatment if spraying is performed the second or third year following logging and burning. Whether 2- or 3-year intervals should be scheduled depends upon the history of logging and burning. On most cutover lands, spraying should not be attempted until the third year and not later than the fourth year after logging. To keep seedlings from producing new seed, it may be necessary to spray before the removal of cedar products and pulp material. On control burns, if burning immediately follows logging, areas should be sprayed the third and not later than the fourth year. There are indications that if burning is delayed for about 10 years after logging, that second year spraying will be as effecitve as third year spraying. A study of a control burn in the South Fork of Potter Creek, Coeur d'Alene National Forest, shows that when burning was delayed for about 10 years after logging, 99% of the ribes seedlings germinated the first year. This drainage was logged in 1941 and 1942, and prescribed control burned in 1951. For *Ribes lacustre* the nearly complete germination of seed the first year after burning is unusual but may well be attributed to the long interval between logging and burning.

Ribes germination and survival as related to silvicultural practices

These are studies on private, state, and federal lands of logging and slash disposal methods in immature and mature stands of white pine as they relate to control practices for ribes eradication. No new information can be added at this time to that reported in USDA Circular No. 919.

DEVELOPMENT OF RUST RESISTANT WHITE PINE, 1953

R. T. Bingham, Pathologist

Nineteen hundred and fifty-three is the fourth year of active cooperative work on the development of blister rust resistant western white pine. Work proceeded as scheduled by joint plans of the Bureau of Entomology and Plant Quarantine, Forest Service, and Bureau of Plant Industry, Soils, and Agricultural Engineering. Selection work and work in making controlled pollinations among selected rust resistant trees were largely completed. Production of resistant tree progenies in the nursery, exposure of the seedling progenies to blister rust, preparation of outplanting plots, progeny outplanting, and progeny examination will become the principal projects for the next few years. Progress in all phases of the cooperative work is reported below.

1. Selection work

No intensive selection work was undertaken in 1953, although in the course of pollination and tree measurement work in the Elk Creek selection area two new selections were found. Selections made to date total 72, 61 of the trees being cankerless and 11 having 1 or 2 cankers apiece.

2. Grafting of selections and other grafting work

Grafting of rust resistant selections to replace those lost on graft outplanting plots continued. Two hundred and seventy-five grafts were made in the greenhouse early in 1953, and 236 more in the field in June and July 1953. Surviving grafts are now being held in a lath house. They will be outplanted as required in 1954 and later years. Forty-six of the seventy-two selections have been successfully grafted and planted on graft outplanting plots. Only 36 of the selections have been propagated to the extent that resistant tree germ plasm may be considered safe. Grafting of the 36 other selections will receive priority in 1954. Half of the newly-cleared $12\frac{1}{2}$-acre Fernwood, Idaho, plot will be planted with 10 grafts of each of the 72 selections.

Some work on flower induction, grafting young scions on older stocks, was started. Employing as stocks young, lightly fruiting plantation trees about 15 years old, and a number of slightly older, heavily fruiting trees, 165 approach grafts with 2- to 6-year-old scions were attempted. 2-0 and 2-4 white pine nursery stocks, roots balled in moist sphagnum moss and wrapped in polyethylene, then in paper sacks, were top-worked into the 15- to 35-year-old stocks. Success was nil. Under Idaho conditions where an abrupt change from cool, rainy, spring weather to hot, dry, summer weather is the rule, the method failed. In the cylinder of moist sphagnum encasing the roots,water was exhausted in 3 to 4 weeks. It is proposed work in approach grafting be continued. Scions grown in soil in small plant bands will be used. The entire tarpaper plant band will be encased in a polyethylene sack and the scion seedling watered periodically.

Another project exploring induction of flowering in young interspecific and intergeneric grafts was started. Early flowering, somehow related to such grafting, has been reported in European literature. Some 200 grafts and control grafts were attempted. A few western white pine scions from 2- and 6-year-old nursery stock made secure unions and survive (through November 1953)

on stocks of *Pinus ponderosa*, *P. contorta*, *P. contorta* x *P. banksiana* (hybrid), *Pseudotsuga taxifolia*, and *Picea engelmannii*. No new scion growth was observed, however, and it is doubtful that these grafts survive the winter. On the other hand, interspecific grafts with young scions of *Pinus monticola* on young stocks of *P. strobus* and on the hybrid *P. monticola* x *P. strobus* were generally successful, making sound unions in as little as 2 weeks. Figure 1 illustrates the method of cleft grafting used in grafting 1-year-old white pine scions upon 1-year-old white pine or white pine hybrid rootstocks. Use of hybrid rootstocks, particularly of those hybrids displaying noticeable vigor, may hold some promise in accelerating vegetative growth and fruiting of desirable scions. Spring grafting of the seedling scions on seedling rootstocks allowed the use of current season "greenwood" in making grafting cuts. Greenwood grafting under polyethylene bags appeared fairly successful. Stocks up to 6 years of age, scions up to 60 years of age, were used. Losses, as with conventional sweatbox-type grafts, occurred in the hardening-off period when polyethylene and shading sacks were removed. Scions remained sensitive even under half-shade of the lath house.

3. Controlled pollination work

The scope of the controlled pollination work for the period 1950-1953 is shown by the following tabulation:

Pollination	Intraspecific Pollinations		Interspecific Pollinations	
Season	Attempted	Successful[1]	Attempted	Successful[1]
1950	83	74	8	4
1951	22	20	11	5
1952	74	57	12	7
1953	91	Not known until 1954	6	Not known until 1954
Total	270	--	37	-

[1]Produced sound seed adequate for 90-seedling progeny trial.

In 1952 and 1953, pollinations were made mostly to satisfy needs of the vigor and quality testing program being carried on in cooperation with the Intermountain Forest and Range Experiment Station.

Needs of rust resistance testing have been more than adequately fulfilled with up to 242 different intraspecific F_1 progenies produced and undergoing exposure to rust in 1953 and 1956. In this intraspecies crossing program are represented 46 of the 72 rust resistant selections. Up to 27 selections have been successfully self-pollinated. Open pollinated seedlings from 27 selections are also included in the testing program, along with 17 lots of ordinary nursery (control) seedlings and 2 lots of controlled pollinated seedlings having as pollen parents rust resistant western white pines from British Columbia (W. A. Porter selections).

The interspecies breeding program will produce up to 20 hybrid progeny with 9 different resistant western white pines and 10 different resistant eastern white pines (A. J. Riker and C. Heimburger selections) used as parents. Several of the hybrid progenies show hybrid vigor (see figure 2).

Figure 1. W-1307
1-year-old scion and stock, cleft grafted.

Figure 2.
Root and top development in white pine seedlings planted in tarpaper plant bands. Seedlings in the row running across the photo in the foreground are western x eastern white pine hybrids. They are more vigorous than the western white pine seedlings occupying the remainder of the flat.

In order to appraise the uniformity of successive pollination, growth, or inoculation seasons, certain selected progenies have been produced yearly. Comparative performance of these "standard" progenies will make possible "growing-season-adjustments" necessary to correct interpretation of results. Some 25 of these standard progenies have been produced.

Work in the production of controlled pollinated progenies needed in the vigor and quality testing program is now fairly well completed. Most of the selections now in graft and many of the 46 selections now included in the pollination program can be classified into phenotypic groups using a system of bole and branch measurements developed by Mr. Squillace. Wide-crowned, coarse branched; narrow-crowned, fine-branched; fast- and slow-growing groups are recognized. Thus, inheritance of qualities of growth rate and tree form can be appraised in seedlings produced from crossing of selections of known phenotypic quality. In time, the genotypic quality of selections will be appraised among grafts of the selections planted on several outplanting sites. If phenotypic and genotypic qualities of selections are similar to the extent that testing for the genotype is most often unnecessary, then this work may be expected to yield useful selection criteria, important in western white pine management.

Good progress can be reported in pairing similar phenotypes. Between 15 and 35 progenies have been produced by controlled crossings within the four phenotypic groups. Graft measurements for appraisal of genotypic characteristics of selections was commenced in the fall of 1953.

4. Nursery production of controlled pollinated progenies continues

Seed produced in the 1951 controlled pollinations were sown in the spring of 1953. The nursery is now at about maximum size, consisting of four 4 x 100 feet seedbeds. Final outplanting of 2-0 stock from 1953 controlled pollinations will clear the nursery in the spring of 1957.

Annual height growth of seedlings from the 1950 and 1951 pollinations, now in the 2-0 and 1-0 stages, respectively, was recorded in September 1953. Some observations on seedling branching were also recorded. In general, seedling height in the 2-0 stage will be ample to allow outplanting as planned. Accordingly, initial outplantings, using the 2-0 stock from 1950 pollinations, will be made in the spring of 1954. Figure 2 shows root and top development in 13½-month-old stock grown in tarpaper plant bands. Some roots have grown through and between several adjacent pots. No matting of the roots was observed at the base of the plant bands but the bands will require separation by running a blade between rows at outplanting time.

Germination of seed from 1951 pollinations (planted spring 1953) was below that of seed from 1950 pollinations (planted spring 1952). This difference, 48.8 percent 1953 germination vs. 84.8 percent 1952 germination, existed despite curtailment in damping-off losses due to treating seed with Arasan and fumigating soil in the plant bands with methyl bromide. Although the forest soil in plant bands was nearly neutral at pH 6.6, further acidification was not attempted. Perhaps pre-emergence damping-off was increased due to existing climatic conditions or variation in watering practice. The alkaline agricultural soil of the beds used for broadcast sowing extra seed soil was fumigated

as above, then acidified using aluminum sulphate so that pH was reduced from 7.4 to 5.8. Arasan-treated seed planted therein germinated more completely. Acidification of forest soil in plant bands should reduce pre-emergence damping-off occurring therein.

Germination of seed planted in 1953 (produced in 1951 pollinations) was as follows:

Type of Pollination	Number of Crosses	No. of Seed Planted	Percent Germination 1/
Intraspecific	17	3,741	48.8
Self-Intraspecific	2	360	13.6
Wind (Open)	4	810	27.7
Interspecific (WWPxEWP)	4	340	96.8

1/ 100-day germination period

It is noteworthy that germination of interspecific hybrids has exceeded that of intraspecific crosses in both 1952 and 1953. Germination percent of the hybrid seed was 90.2 in 1952 and 96.8 in 1953. Hybrid vigor is expressed at the outset with hybrid seeds leading all others in time and rate of germination. Hybrid seed probably remain exposed to attack by damping-off fungi for a relatively shorter period than do ordinary seed. Another possibility in explaining more complete germination of hybrid seed is that the pollen parent (eastern white pine) may transmit resistance to damping-off fungi present at the Spokane nursery. Eastern white pine seedling stands at the Spokane nursery are little affected by damping-off losses. Germination counts were continued through the first week in August, and seeds of many lots were germinating thereafter. Since most of the plant bands used in progeny testing were sown with more than one seed, the residual seedling stands are adequate for most progenies.

5. Seed collection and extraction

Seed from the 1952 controlled pollinations were collected in September 1953. Of the 86 intra-and interspecific pollinations attempted in 1952, 64 produced seed in sufficient numbers for progeny testing. Wind pollinated seed from 19 different selections and from groups of nonresistant trees located in four different selection areas were also collected and extracted. These 87 seed progenies will comprise the third series of progeny trials to be planted in the spring of 1954.

6. First large-scale blister rust inoculations made in Spokane nursery

Dr. James W. Kimmey, of the Division of Forest Pathology, commenced full-scale inoculation work as planned in cooperative agreements. All seedling progenies in the Spokane nursery were exposed to blister rust during the period September 21 through October 2. Cool, cloudy weather during the exposure period may have favored inoculation of seedlings. Ten-foot by twelve-foot tents shaded with flies were employed as inoculation chambers. When tents were wet, evaporative cooling reduced temperatures inside them. Figure 3 shows four tents used as inoculation chambers in one of three settings required to inoculate the four 100-foot seedbeds. Figure 4 shows the interior of the inoculation chamber at

Figure 3. W-1841
Tents with flies being used as inoculation chambers for the exposure of nursery seedlings to blister rust. Evaporative cooling resulting from air movement over watered tents lowered air temperature inside the tents.

Figure 4. W-1843
Fog nozzles operating in the interior of an inoculation chamber at the time of inoculation.

the time of inoculation. Telia-bearing ribes leaves on freshly gathered ribes canes were used as inoculum. The canes were stuck into moist soil to support the leaves above the pine seedlings. Ribes leaves remained fresh throughout the 72-hour inoculations. Telia germinated readily in the cool, saturated atmosphere of the chambers. Fog-nozzles seen in figure 4 were operated only enough to keep the air within the chamber saturated and to keep water droplets suspended on the pine leaves. Dripping of water on or off of pine leaves was avoided as much as possible. Dr. Kimmey reports that inoculation was successful under similar, and probably less favorable inoculation conditions existing at Missoula and Haugan, Montana, in pilot scale inoculations attempted last year. If Spokane nursery seedlings have been successfully inoculated this fall, preliminary results on resistance of F_1 progenies can be expected by the fall of 1954. Cankers on seedlings inoculated in pilot trials have become visible on the stems of seedlings in less than a year.

7. Progeny outplanting sites prepared

Two months of the 1953 season were spent in preparing three progeny outplanting sites on the Cabinet (now Lolo) and St Joe National Forests. The three sites, located at established graft outplanting plots at Randolph Creek and Elk Creek, and at the new Fernwood plotsite, are areas of tilled forest soil within 8-feet-high deerproof exclosures. The Fernwood exclosure is scheduled to handle progeny trials plus all extra transplant materials and is slightly over an acre in size. The other two exclosures are about a half acre in size. Exclosures will serve as storage areas for holding artificially inoculated resistant tree progenies until observations upon inheritance of resistance in the F_1 generation are completed. Ribes have been planted in the exclosures to provide additional natural inoculation of outplanted seedlings.

8. Reports in preparation

Mr. A. E. Squillace, principal cooperator for the Northern Rocky Mountain Forest and Range Experiment Station, is to be senior author of a joint publication on inheritance of growth rate by seedling progenies of resistant selections. Additional joint publications on compatibility and effects of self-pollination in western white pine, on performance of western x eastern white pine hybrids, on occurrence and importance of western white pine races, and on selection measurement methods are now in preparation.

9. Cooperation

Work assignments of all cooperators in the project have been effectively carried out this season. The contributions of Dr. Kimmey of the Division of Forest Pathology deserve special recognition. Cooperation of forest nursery personnel at Savenac Nursery and of BRC operations' personnel is also gratefully acknowledged.

A complete list of active cooperators follows: Northern Rocky Mountain Forest and Range Experiment Station, Inland Empire Work Center, Spokane, Washington; California Forest and Range Experiment Station, Division of Genetics, Berkeley and Placerville, California; Forest Service, Region 1, Division of Timber Management, Missoula and Haugan, Montana; Bureau of Plant Industry, Soils,

and Agricultural Engineering, Division of Forest Pathology, San Francisco, California, and Portland, Oregon; University of Idaho, College of Forestry, Moscow, Idaho; University of Washington, College of Forestry, Seattle, Washington; Montana State University, School of Forestry, Missoula, Montana; University of Wisconsin, College of Agriculture, Department of Plant Pathology, Madison, Wisconsin; Canada Department of Agriculture, Laboratory of Forest Biology, Victoria, B. C.; Ontario Department of Lands and Forests, Southern Experiment Station, Maple, Ontario, Canada; New York State College of Forestry, Syracuse, N.Y.

TRIALS STARTED ON EFFECTIVENESS OF FUNGICIDES IN PREVENTING BLISTER RUST INFECTION

Preliminary trials using fungicides believed promising for preventing blister rust infection of white pine seedlings were made at the Spokane nursery. Formulations of Fermate (ferric dimethyldithiocarbamate), Cunimene D-2601 (rosin amine D pentachlorophenate), and Cunilate 2174 (copper-8-quinolinolate) were sprayed on 1- and 4-year-old western white pine seedlings about 3 weeks in advance of their inoculation with blister rust. Sprayed and unsprayed (control) seedlings, in a randomized block design, were exposed to blister rust for 72 hours in inoculation chambers serviced by Dr. J. W. Kimmey. Depending on success of this exposure, the effectiveness of the fungicides in preventing blister rust infection can be appraised in the next 1 to 3 years.

DEVELOPMENT OF BLISTER RUST ON MAINTENANCE AREAS

Blister rust infection during the fall seasons of 1952 and 1953 was probably negligible, due to long delayed fall rainy seasons both years. Consequently, the extensive maintenance area under study near Elk River, Idaho, probably should not be examined to ascertain the amount of new rust on the sample white pines for the present. Examination of sample trees should be deferred at least 2 years following a fall season favorable for rust spread. If 1954 is favorable for rust development on pine, the plot could be examined in 1956. Possibly a small amount of rust examination work to determine the amount of 1950 through 1952 infection appearing should be undertaken in the meantime. For the 1954 field season, maintenance of plot markers is on the work schedule.

BLISTER RUST DAMAGE SURVEY METHODS TO BE APPRAISED

Professor A. W. Slipp, now handling the University of Idaho, College of Forestry blister rust canker development study, recently published a research note[1] on application of further data on canker growth to rust damage surveys in this region. These data have been developed into a new system for predicting survival of canker and infected trees. As soon as the proposed and existing methods of rust damage survey can be compared on a variety of rust-damaged white pine areas, decisions on revision of existing methods can be made.

[1] Slipp, A. W., Survival probability and its application to damage survey in western white pine infected with blister rust. Univ. Ida., For., Wildlife & Range Expt. Sta. Res. Note 7: 13 pp., June 30, 1953.

IMPROVEMENT OF SPRAY EQUIPMENT USED FOR RIBES ERADICATION

John F. Breakey, Pathologist

The development of an acceptable lightweight, carryable power sprayer, first begun in 1952, continued to be one of the principal objectives in 1953. This work involved (1) The construction of a suitable base for portable pumpers. (2) Testing two types of small gasoline engines. (3) Replacing the chain drive used in 1952 with a V-belt coupling. (4) Continuation of tests of rotary force pumps as pressure units for sprayers.

The Spraywell gun was field-tested as a possible replacement of the "Friend" Pecan gun, and plastic tubing was used experimentally for spray lines. A power spray manual was assembled for spray foremen, and new drawings were made for the string meter. Assistance was given field men in securing canvas tanks, large water-haul tankers, complete coupling and hose layouts for sprayers, and replacement engines for tanker-sprayers.

Portable power sprayers

1. The construction of the pump base

A cast aluminum alloy base, having a built-in manifold and fins for pump mounting and support, was developed from drawings and patterns. Dimensions are: Width 12", length 22", height 6". Space was provided for the engine mounting. The bottom of the base was shaped to nest on a packboard. The picture 5B shows the base and belt guard which were used in the assembly of sprayers. They were cast from patterns illustrated in 6B. As finished the base weighed 8 pounds and the belt guard 1 pound.

2. Lightweight engines

In the following table are listed the data on engines that were tested.

Make of Engine	Name of or Model Number	Horse Power	Net Weight	2-cycle	4-cycle	Approximate Cost of Each	Number Used
Power Products	315	3	23#	X		$ 55	2
Simplex	Power-Pack	3.2	25#	X		60	2
Homelite	30-X	2.5	20#	X		160	1
Briggs & Stratton	8	2.5	36#		X	55	5

a. There were five 2-cycle engines used on portable sprayers. Two were purchased in 1952 from the Power Products Company. These were used again in 1953, together with the Simplex and Homelite engines. Arrangements were also made with the West Bend Aluminum Company to test a $2\frac{1}{2}$ hp experimental model. This last one came out too late for 1953 field tests. Illustrations of these engines are shown for the Power-Pack Model 315 in the 1952 annual report, page 82 (W647); for the Simplex (fig. 6A) and the Homelite (fig. 5A) of this report.

b. A study was made of 4-cycle lightweight engines that are usable as power plants for portable sprayers. Reo, Continental, Clinton, Wisconsin, Lauson, Cushman, Briggs & Stratton, and Koehler were investigated.

The Briggs & Stratton Model 8 was chosen for field trials. This engine is the lightest weight of any of the $2\frac{1}{2}$ hp models of above-named manufacturers of 4-cycle engines. Service and parts are readily available for western jobs.

The first Model 8 engine purchased for this service was illustrated in the 1952 report, page 82 (W416). The new 1953 engines are shown in photos 1A, 2A, 3A, and 4A.

c. In attempting to secure power parts for the assembly of carryable sprayers, the objective was a reliable gasoline unit of $2\frac{1}{2}$ hp, with a net weight not exceeding 42 pounds. All of the above engines, either 2- or 4-cycle, are air-cooled. The 2-cycle range from 20 to 30 pounds per engine. The 4-cycle engines weigh from 36 to 45 pounds.

3. Pump and engine drive or coupling

The ideal engine-pump coupling is a direct drive assembly whereby the pump and engine run at the same r.p.m. Since pump wear is rapid at high speeds and efficiency of the pump may drop at excessive speeds, pump manufacturers usually recommend the slower, more positive type pump.

It was therefore decided to use the slow speed rotary force pumps. These require a V-belt or chain drive. Chain drives were used in 1952, which are shown on page 82 of the 1952 report. As the chain drives were noisy, required a close shield for safety, and wore out in a short time, V-belt couplings were used on the 1953 portable pumpers. These are shown in the accompanying pictures. The special belt guard is shown in 5B. The full-guard is used on pumpers in 3A, 4A, and 5A. The half-guard is used on pumpers in 1A, 2A, and 6A.

Single "A" size groove ($\frac{1}{2}$" x 11/32") pulleys were used on all of the pumps. Sheave diameters were: ECO pump 8.4 inches, and HYPRO pump 9 inches. Engine pulleys used were single "A" size made from cast iron. The diameters of the engine pulleys ranged from $2\frac{1}{4}$ to $3\frac{1}{2}$ inches, to set pump r.p.m. to manufacturers' specifications.

4. Rotary force pumps

Rotary force pumps of two makes (ECO and HYPRO) were used on the small portable pumpers. They were selected because maximum capacities are 4 to 8 gallons per minute, and each can be operated at from 150 to 200 p.s.i. Also, the manufacturers' specifications indicated that engine power of $2\frac{1}{4}$ to $2\frac{1}{2}$ hp is sufficient for operation.

The ECO pumps are illustrated in photos 3A, 4A, 5A, and 6A. The HYPRO pump is shown in 1A and 2A.

Make of Pump	Model	Capacity g.p.m.	Speed r.p.m.	Net Weight	p.s.i.	Cost	No. Used	Field Output Average Gallons Per Hour 2 or 3 Guns High	Low	4 Guns High	Low
ECO	2M-3/4	5-6	1,400	8½#	200	$44.50	5	75	41.5		
HYPRO	6000	6-8	800	10½#	160	34.50	1	75	50	125	75

5. Field performance of the pumps and engines

a. Portable pumpers fitted with ECO pumps were operated on Yellowstone and Sequoia National Parks, and Plumas, Kaniksu, Coeur d'Alene, and Kootenai National Forests. Each of the pumps was equipped with oilproof rubber impellers. Buna rubber and micarta were used in these pumps in 1952, and neither type of impeller was adaptable to 2,4,5-T or 2,4-D and oil sprays. Pumps equipped with oilproof impellers gave service for 50 to 150 hours only.

Variations in time of effective operation between individual pumps was caused by periodic dry or unprimed operation. Oilproof impellers swell and distort quickly when the pump runs dry. The pump also generates heat rapidly. Changes in impeller shape and size render the pumps unfit for service.

The ECO Engineering Company, Newark, New Jersey, supplied the National Park Service at Yellowstone with replacement impellers made from a material called "Formica." This impeller gave satisfactory service to the end of spray season.

A model 2M ECO pump with 1-3/4" diameter impellers using high lift cams furnishes sufficient spray for three nozzlemen (4 g.p.m. at 200 p.s.i.). Internal working parts of ECO pumps are shown in illustration 4B.

b. The HYPRO rotary force pump - 6000 series cast iron case - manufactured by Hypro Engineering Company, Inc., Minneapolis, Minnesota, was used, as shown in illustrations 1A and 2A. It is also illustrated in 2B and bottom half of 1B. This unit employs nylon rollers that float freely in slotted rotor to propel the liquids which it pumps. Rollers are weighted with brass cores. This feature holds them securely against the outside wall of pump case.

The HYPRO pump furnishes sufficient spray material (6 g.p.m. at 160 p.s.i.) for four nozzlemen. The pump shown in 1A and 1B was in service for 75 hours. No change in the pump's performance was noted during the trial period. Examination at the close of season showed the nylon rollers' surfaces were roughened and cast iron core interior of pump was lightly scratched.

c. The performances of the 2- and 4-cycle engines are compared. The sprayers using the 2-cycle engines weighed from 10 to 15 pounds less than those with the 4-cycle power. Forty-five pound portable sprayers were assembled with 2-cycle power. Those using the 4-cycle engines weighed from 60 to 64 pounds.

Sprayers assembled in 1953 for the National Park Service and the Plumas National Forest were fitted with Briggs & Stratton Model 8 engines. Five portable sprayers were fitted with 2-cycle engines. Field trials showed that the 2-cycle engines were subject to excess vibration. They were slower to start than the 4-cycle variety. They also collected carbon much more rapidly than the 4-cycle power plants.

The Coeur d'Alene and Kootenai National Forests replaced the 2-cycle Simplex engines with B&S Model 8 power units in midseason.

6. Portable power sprayer accessories

Portable power sprayer accessories that are attached to or supplied with each unit are: A pressure gauge size 2" or 2½" with a rating of 200 to 300 p.s.i.; a pressure regulator or relief valve (a satisfactory one is the Dobbins spring valve No. 549 shown in photo 2A). The detachable pump suction line is a 3/4" I.D. by 8' long wire reinforced hose having a female pipe coupling at both ends. Strainer for the suction line is an F. E. Myers Company small sprayer strainer No. 1-B-4731A with a 3/4" i.p. male thread. The pressure regulator by-pass line is 3/8" by 8' with water hose thread coupling to match the thread on the relief outlet. The flow from this line is used to keep the spray mixture agitated in storage tank.

Each portable sprayer was supplied with an ejector tank filler. The No. 63A Series A Penberthy Bronze Hydraulic Ejector uses a 1" x 36" suction and a 1" x 50' discharge hose. The ejector was fitted with a tip having a 1/8" orifice. A Myers Company small sprayer strainer No. 6026A was used on the suction hose. Rate of filler flow is from 15 to 25 gallons per minute. The rate of flow is governed by pump pressure and lift in feet.

The spray manifolds were each equipped with one 4304 and two 3303 Foster Quick Couplers. The Plumas Forest and Yellowstone Park sprayers were assembled with carrying handles (fig. 3A). Others were supplied with corner eye-bolts (figs. 1A and 2A). A special feature devised in midseason was the belt tightener shown in fig. 1A.

Spray guns used on power sprayers

During the last 10 years in the spraying of upland ribes, the following spray guns have been used on power sprayers: Bean No. 789 (cost $10.50 each), approximately 35 employed extensively on brush spraying; Bean No. 780 (cost $17 each), about 10 used on portable power sprayers; and Bean No. 785 (cost $42 each), 6 employed on power sprayers. There was also "Friend" 16" Pecan gun No. LCPA 354C (cost $8.25 and $17.65 each), about 40 employed on power sprayers.

The Pecan gun is efficient and is universally liked by the field crews. In the past 2 years it has become increasingly difficult to get delivery on the Pecan gun. The price has risen to $17.65 per gun.

During the 1953 spraying season, a Spraywell gun (shown in top photo 1B) was tested by field crews on ribes spraying. The performance of the gun was excellent when equipped with a No. 4 (4/64" orifice) or a No. 5 (5/64" orifice) spray disc and a special thin leather head gasket. Current price of the Spraywell gun is $7.75 each.

Spray lines for power sprayers

1. Since 1928 rubber hose lines have been standard equipment in ribes eradication by power sprayers. There have been advances in design of couplers (Foster and Hansen pneumatic-type) which have been adopted. The new oil-resistant, lightweight spray hose (Gates Brand 19B oilproof), a 2-braid red rubber with oil-resistant tube and cover, is a favorite with spray crewmen in the Northwest. Crewmen prefer the red hose primarily because it is much more easily seen. Also, it may be less attractive to chewing animals. This latter observation should be studied further because the loss of hose and of crew time involved in replacing hose are significant cost items. Bid specifications should be written so as to provide red hose with a smooth outside cover.

2. Field tests were made using plastic tubing as a substitute for rubber hose layouts on power sprayers. Its light weight (one-third to one-half that of the same I.D. hose) and ease in handling should make it preferable to hose. Further studies must be made of satisfactory ways to hold couplings on the tubing. Hot sun breaks down the wall strength of the tubing. In this state, pressures of 200 p.s.i. will cause it to fracture. The two sizes tested were ¼" and 3/8" I.D. in lengths of 100 and 200 feet.

Power spraying equipment manual

An equipment manual of 34 pages covering the power sprayers in use in Northwestern blister rust control was compiled. It contains sprayer illustrations, accompanying parts lists, and directions for operating the sprayers. There is also included information on hose, couplings, nozzles, and layouts. The manual was copied, published, and distributed for field use by the Spokane office staff.

Technical assistance to field stations

Complete hose and coupling assemblies were ordered and assembled for some of the field foremen. The Forest Service canvas shop, Spokane, made some excellent 220-gallon tanks for portable power sprayers. Steel tanks were ordered for water haul trucks, and replacement engines were installed on truck-mounted sprayers.

PICTURES OF PORTABLE POWER SPRAYERS USED IN BLISTER RUST CONTROL

1A Portable sprayer showing Briggs & Stratton Model 8 engine of $2\frac{1}{2}$ hp, V-belt tightener, light metal guard and base, and corner carrying eyes. Engine pulley is $2\frac{1}{4}$" diameter, and HYPRO pump wheel is 9" diameter.

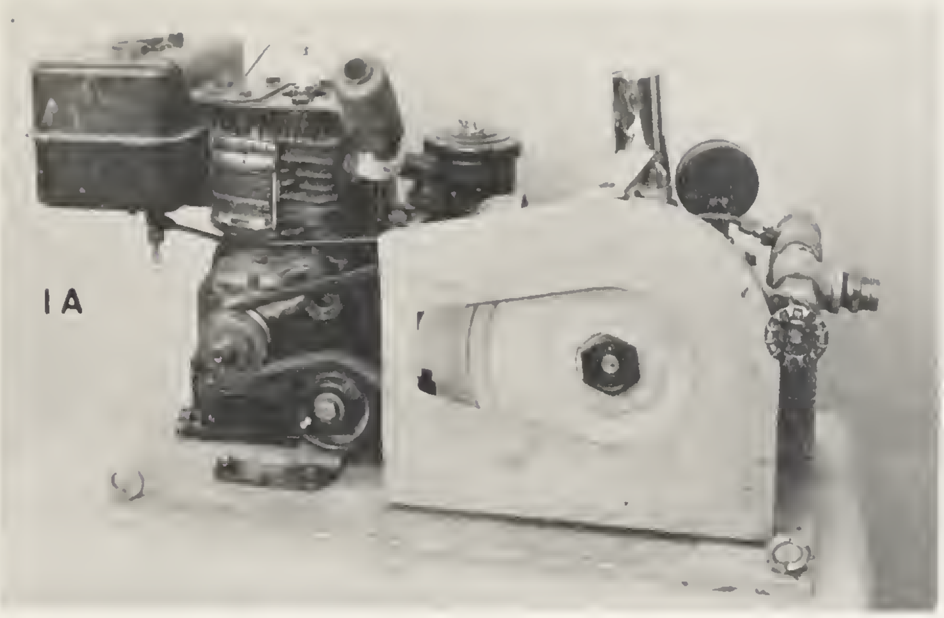
2A Top view of sprayer 1A. Showsthe HYPRO 6000 rotary force pump having nylon rollers and the Dobbins No. 549 ball check relief valve in horizontal position above couplers. On spray manifold are one 4304 and two 3303 Foster quick couplers. Pressure gauge and an upright air tank are shown.

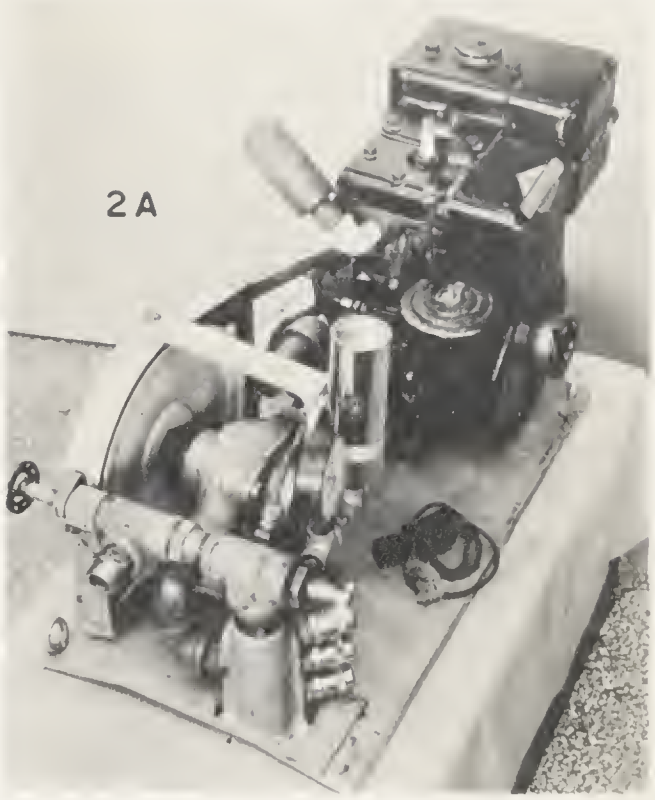
3A Portable power sprayer assembled for use in Yellowstone National Park and Plumas National Forest. It uses an ECO 3/4" size high pressure pump and a Briggs & Stratton Model 8 engine. Removable carrying handles were supplied. Extra wrenches and impellers for pump were also included. Foster quick couplers are same as in 2A.

4A An outside view of 3A, illustrating light metal guard and base. Carrying handles have been removed.

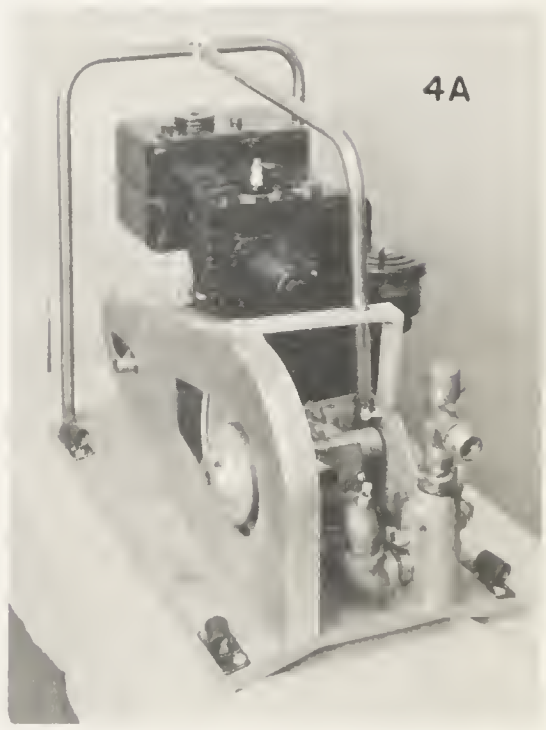
5A Portable sprayer using an ECO 3/4" pump and a Homelite Model 30-X engine. Relief valve is a standard, lightweight ball check type. Foster couplers are the same as in 2A.

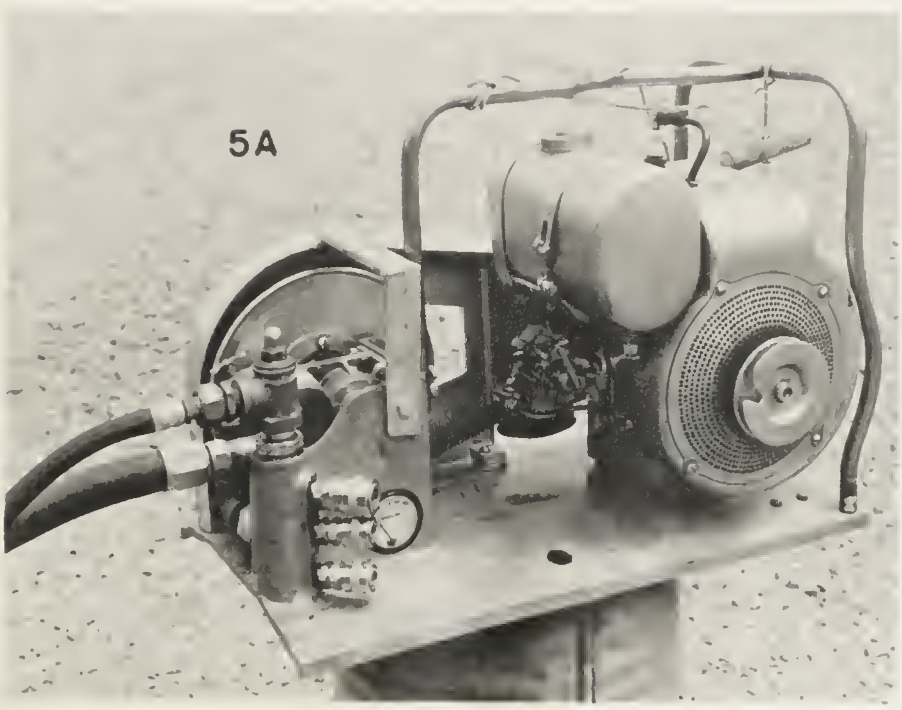
6A Portable sprayer assembled for use with a separate fuel tank fed by special gasoline hose. The power plant is a Simplex 2-cycle engine.

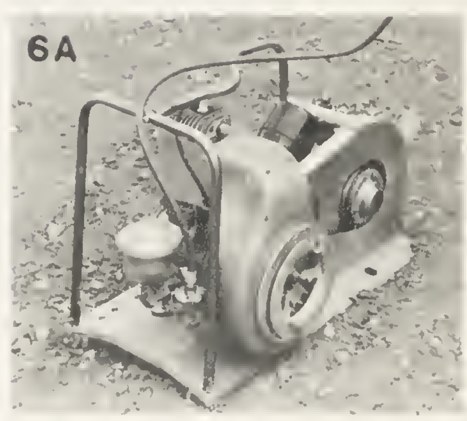

1A


2A


3A


4A


5A


6A

PARTS MAKING UP PORTABLE POWER SPRAYERS FOR BLISTER RUST CONTROL

1B Top: Spraywell brush and orchard gun. Bottom: The HYPRO No. 6000 pump is shown with exposed parts. The rotor, nylon rollers, and cast iron block are displayed. The rotor is mounted on two ball bearings. Six nylon rollers, set in rotor head, press against the outside case shell when the shaft revolves. The rubber-like rollers make a tight seal.

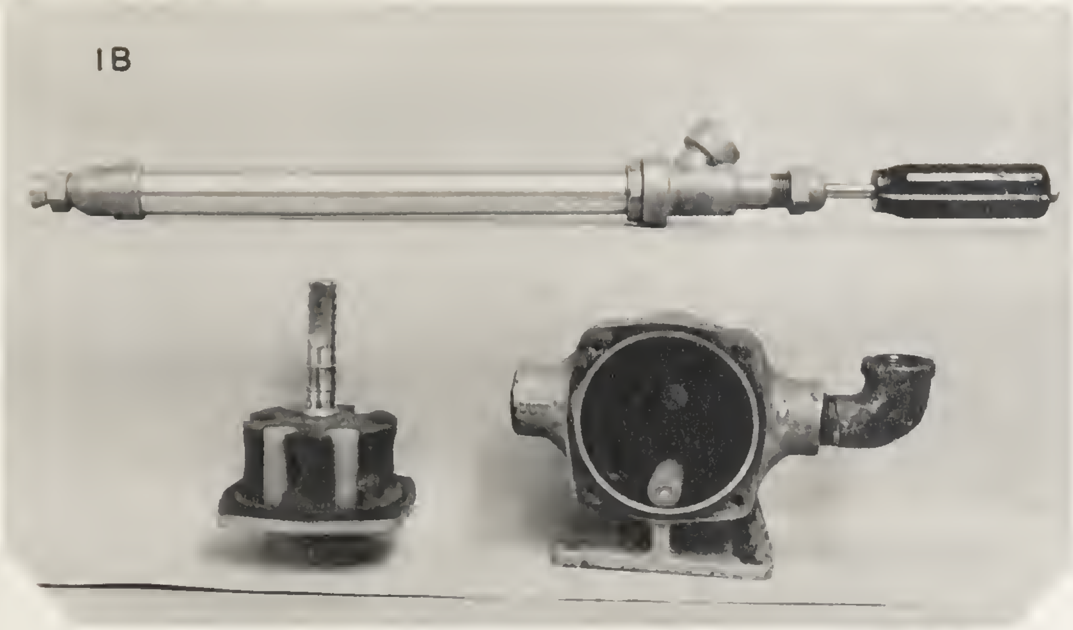
2B The HYPRO 6000 series assembled pump.

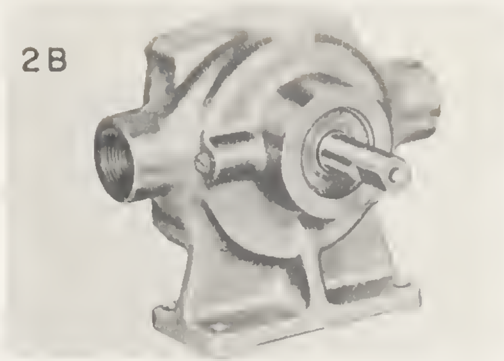
3B The ECO pump with outboard bearing (set inside of cone in V-pulley). The outboard bearing is furnished for belt or chain drives.

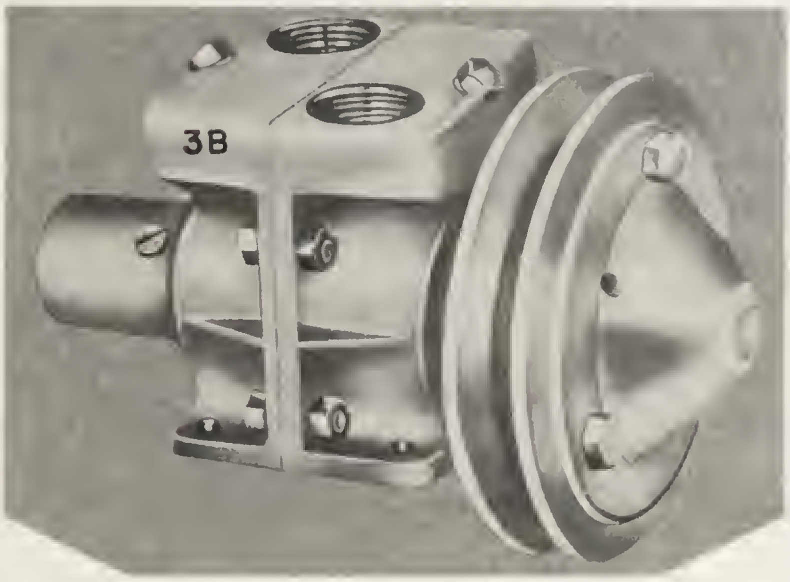
4B Displayed are the internal working parts of the ECO pump.

5B Lightweight aluminum alloy pump base and belt guard used in assembly of portable sprayers. Special core in base is for spray manifold.

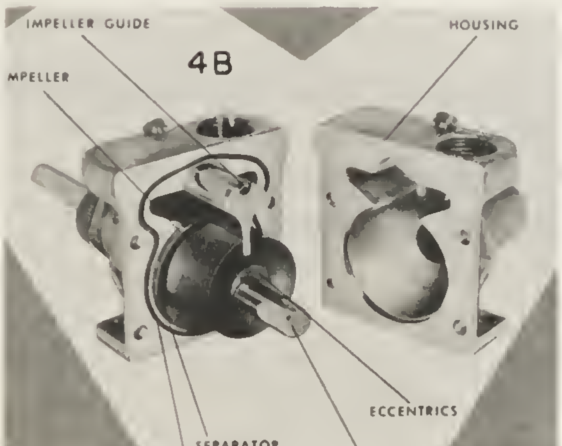
6B Patterns for the lightweight aluminum alloy portable sprayer base and belt guard. The base pattern is of polished aluminum. A matching board used in casting is illustrated beneath the base pattern. The masonite pattern for belt guard is shown attached to its forming board. The pattern and boards fit the standard foundry moulding boxes.

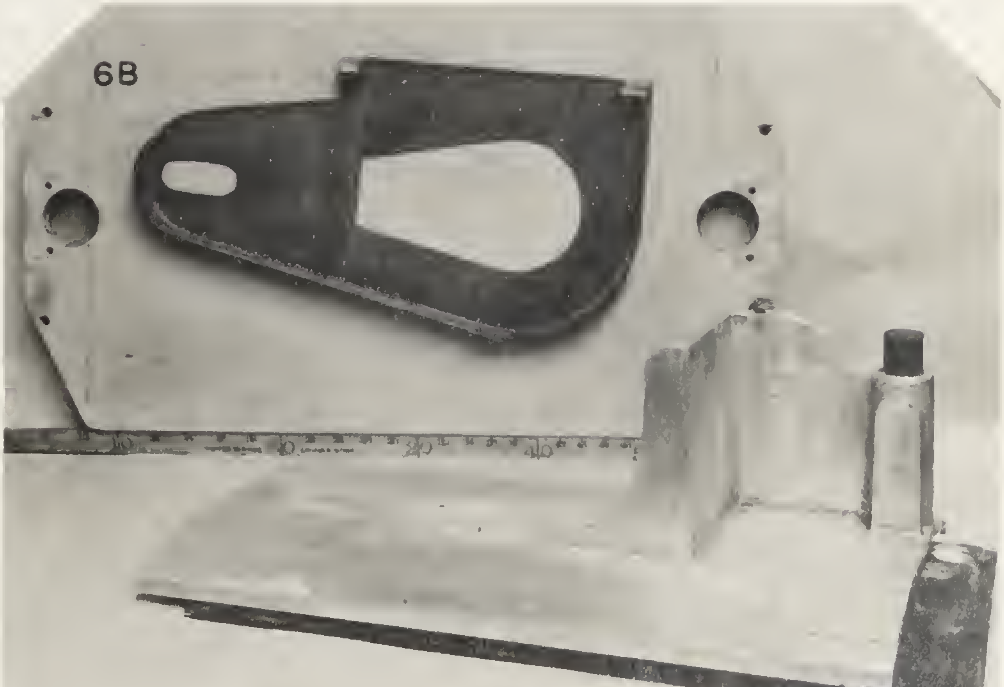

1B


2B


3B


5B


IMPELLER GUIDE
4B
HOUSING
MPELLER
ECCENTRICS
SEPARATOR
HOUSING GASKET
SHAFT


6B

ORGANIZATION OF THE NORTHWESTERN PROJECT - 1953

1. Project Leader in Charge, H. E. Swanson

2. Assistant Project Leader, F. O. Walters

3. Cooperative Local Control:

   a. Clearwater Area, Idaho:
      Area Leader, M. C. Riley
      Assistant Area Leader, D. F. Williams
      District Leader, J. P. Bushfield
      Camp Superintendent, William Holland
   b. St. Joe Area, Idaho:
      Area Leader, H. J. Hartman
      Assistant Area Leader, W. F. Painter
      Control Aid, R. E. Myers
      Automotive Mechanic, L. C. Miller
      Camp Superintendent, A. E. Turner (Fur. eff. 10/26/53)
   c. Coeur d'Alene Area, Idaho:
      Area Leader, F. J. Heinrich
   d. Kaniksu Area, Idaho-Washington:
      Area Leader, H. A. Brischle
      Control Aid, J. C. Gonyou
      Checking Supervisor, Quentin W. Larson
   e. Montana Area:
      Area Leader, H. J. Faulkner
   f. National Parks, Washington-Montana-Wyoming-Colorado:
      Area Leader, J. C. Gynn
      District Leader, C. M. Chapman

4. Education and Information:
      H. Miller Cowling, Photographer

5. Office and Warehouse:
      L. E. Klatt, Administrative Assistant
      E. K. LaPrey, Storekeeper
      M. P. Kirsten, Secretary (Steno.)
      A. B. Treffry, Secretary (Steno.)
      J. L. Radkey, Clerk-Typist (Term. eff. 6/30/53)

Developmental and Improvement (Project Leader, H. R. Offord, Berkeley, Calif.)
   V. D. Moss, Forest Ecologist
   R. T. Bingham, Pathologist
   J. F. Breakey, Pathologist

AGRICULTURE
Spokane, Wash.

APPROPRIATIONS
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NORTHWESTERN PROJECT, BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1953:

Project W-a.W NW (Administrative)	$128,656.21	
Project W-e.W NW (Cooperative)	110,556.82	
		$239,213.03

Fiscal Year 1954 (as of 12/31/53):

Project W-a.4 (Administrative)	$132,112.00	
Project W-e.4 (Cooperative)	99,200.00	
		$231,312.00

Contributed Funds (Deposited with U. S. Treasury)

State of Idaho		$ 30,000.00	
Clearwater Timber Protective Association	$10,395.12		
Potlatch Timber Protective Association	8,317.89		
Priest Lake Timber Protective Association	6,292.03	25,005.04	
			$ 55,005.04

FEDERAL EXPENDITURES, NORTHWESTERN PROJECT, BLISTER RUST CONTROL
CALENDAR YEAR 1953, REGULAR APPROPRIATIONS

	Area		Salaries	Expense	Total
	January 1 to June 30, 1953				
I	Planning, Coordination, Technical Direction				
	1.1 - Clearwater Area, Idaho		$ 7,811.10	$ 575.94	$ 8,387.04
	1.2 - St. Joe Area, Idaho		7,995.93	1,652.86	9,648.79
	1.3 - Kaniksu Area, Idaho		7,067.08	363.24	7,430.32
	1.4 - Coeur d'Alene Area, Idaho		2,944.67	39.95	2,984.62
	1.5 - Cabinet Area, Montana		1,472.34	85.35	1,557.69
	1.5 - Kootenai Area, Montana		1,472.34	85.35	1,557.69
	1.6 - National Parks Area		5,403.05	503.11	5,906.16
	Supervision, Office, Warehouse, Investigations, and Education		22,364.26	(1)-339.42	22,024.84
	Total, Project I, Jan. 1-June 30, 1953	(2)	$ 56,530.77	$ 2,966.38	$ 59,497.15
III	Cooperative Ribes Eradication on State and Private Lands				
	3.1 - Clearwater Area, Idaho		$ 8,417.37	$ 3,381.19	$ 11,798.56
	3.2 - St. Joe Area, Idaho		8,803.64	9,408.83	18,212.47
	3.3 - Kaniksu Area, Idaho		1,360.56	(3)1,756.26	3,116.82
	Total, Project III, Jan. 1-June 30, 1953		$ 18,581.57	$14,546.28	$ 33,127.85
	July 1 to December 31, 1953				
I	1.1 - Clearwater Area, Idaho	(4)	$ 6,404.59	$ 527.66	$ 6,932.25
	1.2 - St. Joe Area, Idaho	(4)	6,101.65	1,023.24	7,124.89
	1.3 - Kaniksu Area, Idaho	(4)	6,041.23	513.34	6,554.57
	1.4 - Coeur d'Alene Area, Idaho		2,807.69	156.36	2,964.05
	1.5 - Cabinet Area, Montana		1,403.84	123.50	1,527.34
	1.5 - Kootenai Area, Montana		1,403.84	123.50	1,527.34
	1.6 - National Parks Area		5,151.72	1,279.89	6,431.61
	Supervision, Office, Warehouse, Investigations, and Education	(4)	17,814.78	3,015.41	20,830.19
	Total Project I, July 1-Dec. 31, 1953	(5)	47,129.34	6,762.90	53,892.24
III	3.1 - Clearwater Area, Idaho	(4)	23,972.98	6,607.56	30,580.54
	3.2 - St. Joe Area, Idaho	(4)	18,821.13	8,083.64	26,904.77
	3.3 - Kaniksu Area, Idaho		10,171.96	2,312.57	12,484.53
	Total Project III, July 1-Dec. 31, 1953		52,966.07	17,003.77	69,969.84
	Grand Total, Calendar Year 1953		$175,207.75	$41,279.33	$216,487.08

(1) Item reduced $2,398.89 to adjust overage in same item in 1952 annual report (July 1-Dec. 31, 1952). Correct figure 7/1-12/31/52, $3,537.06; correct figure 1/1-6/30/53, $2,738.31.

(2) Project I area salary includes $3,150 expenditure from miscellaneous expense funds.

(3) Includes chemical $305.10, purchased fiscal year 1952 funds.

(4) Forest Service reimbursements for period 7/1-11/7/53, deducted from area salary amounts; reimbursements will be received 4th quarter fiscal year 1954, as follows:

Clearwater	W-a	$1,633.15,	W-e	$193.64
St. Joe	W-a	1,633.15,	W-e	28.83
Kaniksu	W-a	1,530.20		
Supervision	W-a	2,544.72		
Total $7,563.69				

(5) Project I area salary includes $500 expenditure from miscellaneous expense funds.

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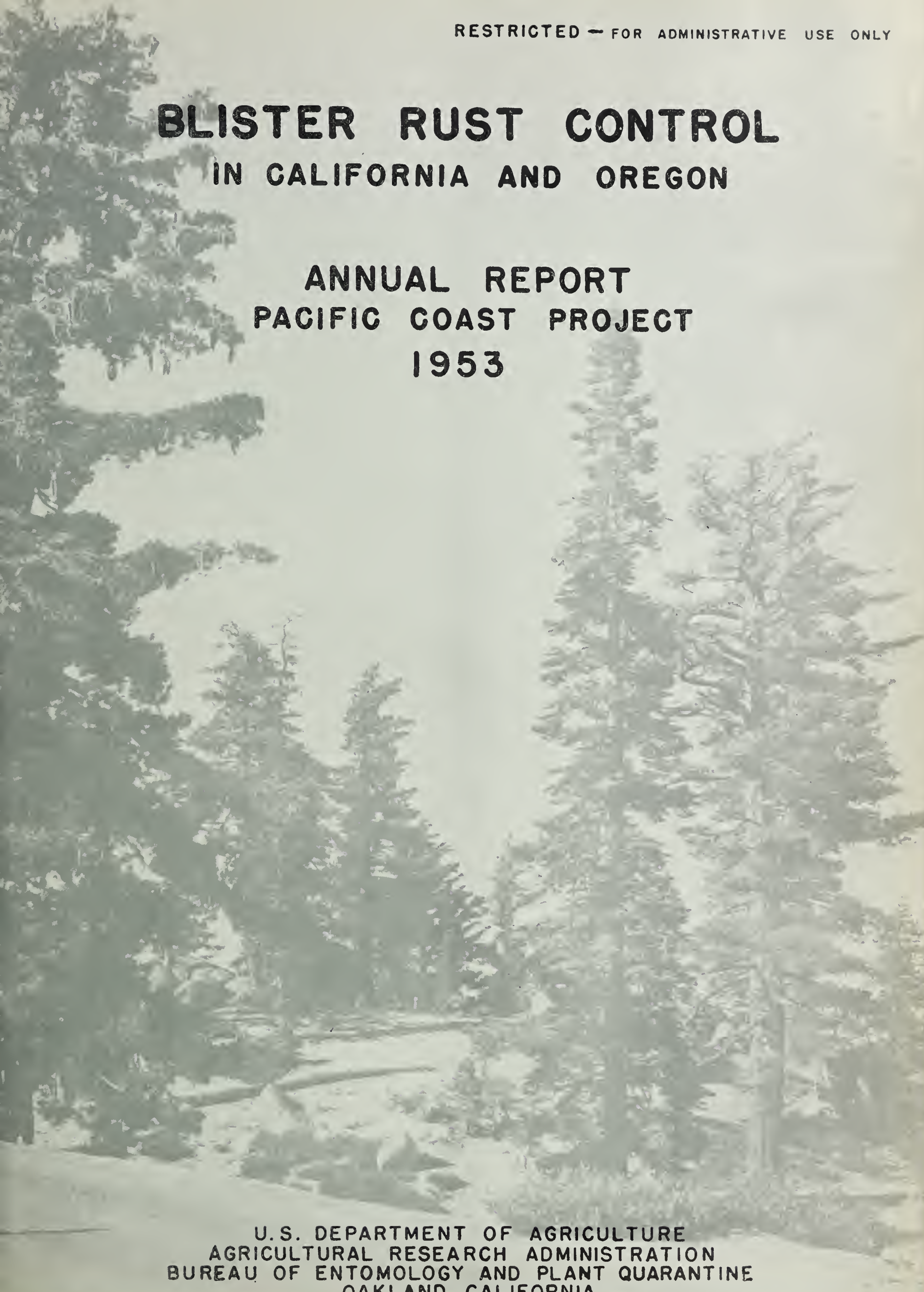
BLISTER RUST CONTROL
IN CALIFORNIA AND OREGON

ANNUAL REPORT
PACIFIC COAST PROJECT
1953



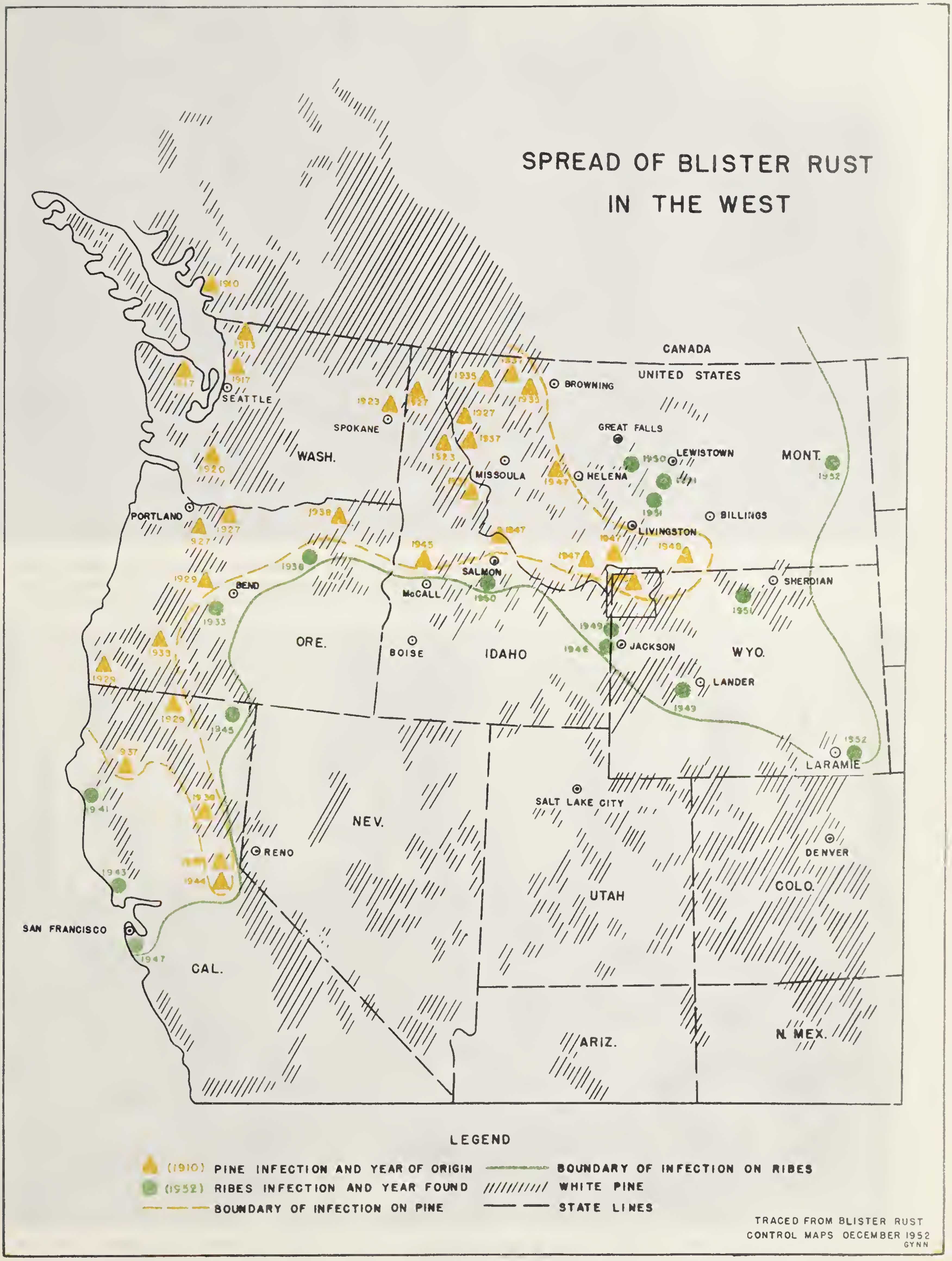
U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
OAKLAND, CALIFORNIA

ANNUAL REPORT
ON
THE CONTROL OF WHITE PINE BLISTER RUST
IN
CALIFORNIA AND OREGON
FOR THE
CALENDAR YEAR 1953

HIGHLIGHTS OF 1953 By T. H. Harris, Project Leader

PROGRAM REPORTS By Arthur London, Operation Supervisor

United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine
Pacific Coast Project
1515 Clay Street, Sixth Floor
Oakland 12, California
January 1954


SPREAD OF BLISTER RUST
IN THE WEST
CANADA
UNITED STATES
SEATTLE
SPOKANE
WASH.
PORTLAND
BEND
ORE.
BOISE
McCALL
SALMON
IDAHO
MISSOULA
BROWNING
HELENA
GREAT FALLS
LEWISTOWN
BILLINGS
LIVINGSTON
MONT.
SHERDIAN
JACKSON
LANDER
WYO.
LARAMIE
SALT LAKE CITY
UTAH
DENVER
COLO.
RENO
NEV.
SAN FRANCISCO
CAL.
ARIZ.
N. MEX.
LEGEND
(1910) PINE INFECTION AND YEAR OF ORIGIN
(1952) RIBES INFECTION AND YEAR FOUND
BOUNDARY OF INFECTION ON PINE
BOUNDARY OF INFECTION ON RIBES
WHITE PINE
STATE LINES
TRACED FROM BLISTER RUST
CONTROL MAPS DECEMBER 1952
GYNN

S-1. This photograph illustrates the destructiveness of white pine blister rust at Spirit Lake, Washington, where it was permitted to spread unchecked. Stands such as this, when unprotected, do not long survive after the disease has attacked.

W-1394. This young stand of sugar pine is typical of many such stands in California where blister rust protective work has been done. Control of blister rust in California is a cooperative project, financed by the State of California, the Federal Government, and private lumber companies.

CONTENTS

CONTROL PROGRAM

DEVELOPMENT AND IMPROVEMENT PROJECT

HIGHLIGHTS OF 1953

White pine blister rust is a forest tree disease caused by a fungus (Cronartium ribicola, Fisher) introduced into North America from Europe about 1900. The disease is widespread throughout Oregon and northern California, where it is severely damaging and killing native white pines. The continued production of white pine timber without control of blister rust is not possible. The problem, then, is the protection of commercial and recreational stands of white pine, a task accomplished through the destruction of the carrier host plants of the fungus, currants and gooseberries (collectively called ribes), growing in the stands.

The immediate objectives of the control program are: (1) the protection of selected stands from imminent rust damage through destruction of endangering ribes populations, (2) ribes suppression in stands where blister rust is not yet present through the proper ecologic timing of the ribes removal jobs. The ultimate objective is the production of crops of white pine and the protection of recreational stands through the permanent suppression of ribes.

SUGAR PINE IS A SOURCE OF SUPERIOR WOOD PRODUCTS

Sugar pine, most important commercially of the white pines in Oregon and California, is the largest of the world's pines. According to recent forest-survey findings there is an inventory of some 33.5 billion board feet of sugar pine now standing in the forests of these two states. A conservative market value for sugar pine stumpage is now about $25 per thousand board feet. Sugar pine standing timber is therefore worth about $837,000,000. In addition to this, existing immature growth will produce at maturity an estimated 13 billion board feet worth $324,000,000. Most of the mature growth may be harvested before it is destroyed by blister rust. The real threat from blister rust damage and destruction is to the present immature stands and to future generations of white pine reproduction.

Sugar pine produces a superior wood prized for its ease of working, straight grain, and shape holding qualities. Used for foundry patterns, mill work, mouldings, carvings, and exterior work, it is a premium, specialty-use wood. In the white pine markets of the nation the species fills a recognized economic need.

COOPERATION ACHIEVES PROGRAM GOALS

The Bureau of Entomology and Plant Quarantine in 1953 cooperated with the following Federal land-managing agencies by furnishing leadership, coordination, and technical direction to their control projects:

National Park Service, Region 4 (California and Oregon)
Bureau of Land Management (U. S. Dept. of the Interior) (Oregon)
Forest Service, Region 5 (California)
Forest Service, Region 6 (Oregon)

Under the terms of an agreement advantageous to both parties the Bureau administered the control work of the Forest Service program in California.

The protection of private and state lands in California is a cooperative undertaking of the State of California, private timberland owners, and the Federal Government. California again contributed substantially to the Project through an appropriation of $168,000 for fiscal year 1954, through contributed labor, and through indirect means. The Michigan-California Lumber Company again allotted $2,000 and the Stockton Box Company $200. As a result of sugar pine delineation surveys conducted by the Bureau, subsequent reports and discussions, and an analysis of the timber-growing possibilities of their lands, three timberland owners in 1953 adopted a policy of management for sugar pine on sites so adapted. They then took the next necessary step and became financial cooperators in the control work on state and private forests. These owners are the Southern California Edison Company and the Edison Securities Company of Los Angeles, each of which contributed $500, and the Shasta Forests Company of Redding, California, which contributed $150.

The Project staff is working toward increasing the coordination of blister rust control work with sugar pine management on private and public lands. With the completion of the sugar pine economic study and the near completion of pine delineation work, the practical goals of control work have been established. Information is available as to market demand, available growing sites, and production factors such as present stocking, kind of stand improvement and management measures needed, interest rates and production costs including the cost of blister rust control. With this information economic production guides in terms of acreage and board feet to be grown can be suggested to timberland owners; cooperation between the Bureau and state and private owners is constantly increasing in this field.

A PROGRESS REPORT ON CONTROL WORK

Beginning in 1949 the application of local control and of economic criteria to the selection of sugar pine stands has brought about a reappraisal of control areas in California and Oregon. This work, effected through the pine-delineation project, is now about 95% finished. Control areas in these two states now total 785,000 acres, divided between 629,000 acres in commercial stands and 156,000 acres in national parks. Eighty-three per cent of the total has received initial ribes eradication, 53% second and subsequent treatments, and 22% of the total control acreage is on maintenance. The commercial stands are 66% publicly owned and 34% private.

The present control area (for practical purposes synonymous with the area under sugar pine management) of 785,000 acres is a minimum figure. Economic criteria and local control concepts have been rigidly applied in the field with the purpose of eliminating all submarginal stands and of placing the growing of sugar pine on a strictly economic basis. If, upon analysis, the productivity of this total area should fall below the minimum

production goal established by Professor Vaux's economic study* as being required to sustain the sugar pine market, the area will have to be increased.

The total control acreage will probably never become a static figure. A small amount of field delineation will continue indefinitely, and will result in the addition of managed stands from time to time. Furthermore, since forest management is just beginning to come into its own in the sugar pine belt, more and more forest land will come under management with each succeeding year. The natural result of this will be an increase in the amount of land devoted to the growth of sugar pine with consequent additions to the control area. For these reasons the present control area should be considered a minimum. A total area of about a million acres is a more probable size, even in the immediate future.

At the present rate of progress initial work will be completed in from 6 to 8 years. About 58% of the control area is cut-over. The suppression of ribes on presently cut-over lands will require from 15 to 20 years; these lands should then be in a state of maintenance until they are further disturbed. The mature timber remaining on commercial lands is being logged currently and will probably be completely logged in the next two or three decades. Logging, through soil disturbance, sets off a cycle of vigorous ribes regeneration requiring another cycle of eradication treatments. It is axiomatic that the control task eventually will be geared to the amount of disturbance occurring within control areas. The total period for the control task can hardly be condensed significantly. Although the initial work remaining (134,000 acres) could be done in less time if funds were available, the resultant pyramiding of reeradications and the full utilization of the present staff hardly make a speed-up advisable. Rate of disturbance, mainly logging, is the controlling factor determining the rate at which eradicative treatments are performed. The timing of eradication work is wholly an ecologic and pathologic matter. These successive treatments cannot be telescoped if the work is to be efficiently and economically done. After control of the disease has been established, maintenance work will be required indefinitely at a small annual charge per acre. It will consist in the removal of ribes plants regenerating in small areas of permanent ribes sites and of occasional regenerating plants.

ACCOMPLISHMENTS IN 1953

Ribes were destroyed on 74,000 acres during the 1953 season, 48% of this acreage being covered by contractors (35,824 acres) at an average price of $7.33 per acre. Ribes surveys showed that an additional 26,000 acres did not need eradicative treatment at this time. Total area treated decreased from 114,000 acres in 1952 to 100,000 acres in 1953, a decrease of 14,000 acres. Actual worked acres increased 13,000 over the 1952 season; the difference occurs in the amount of acreage checked and meeting standards without working. About 5.5 million ribes were destroyed. The initial

* "The Economics of the Young-Growth Sugar Pine Resource" by Henry J. Vaux, California Agricultural Experiment Station, College of Agriculture, University of California, Berkeley, January 1954.

protection of all selected foxtail pine stands in the High Sierra of Sequoia National Park was completed. The High-Sierra work involved all modes of transportation from cargo drops by aircraft to slow mule trains for the servicing and supply of the camps and personnel involved.

The sugar pine delineation surveys, based on the economic studies, are now about 95% complete. In general only those stands in which the value of the product at harvest will equal or exceed the cost of production are being considered for rust protection. Joint action has been taken with land owners in the initial selection of stands and in discussions of management policy. It is encouraging to note the tremendous growing interest on the part of timberland owners in the basic problems of forest management and forest pest control. This growing interest is reflected in the increased cooperation and participation of private owners in control work.

The correlation of management and rust control was also strengthened, as an instance on the Rogue River operation in Oregon will illustrate. Officials of the Bureau and Forest Service of Region 6 worked out the preliminary details to increase the correlation of timber sales, logging plans, and salvage logging with blister rust control work. Provisions were made for close liaison between the field timber management staff, the Rogue River Forest's blister rust control project, and the Bureau's technical advisers.

CHANGES IN FINANCING AND ORGANIZATION

New contributions to the work on private lands were made by the Southern California Edison Company ($1,000) and the Shasta Forests Company ($150). Federal funds for leadership, coordination, and technical direction by the Bureau (fiscal year 1954) were reduced by $15,250 below the previous fiscal year; Federal funds for control work on state and private lands were reduced by $1,668 for the same period. Leadership activities, because of the reduction, were reduced to the minimum.

The end of the year saw the transfer of the Bureau's project activities to the Forest Service effective January 1, 1954. This was in accordance with orders issued October 13, 1953 by the Secretary of Agriculture. The Pacific Coast Blister Rust Control Project, which formerly handled work in California and Oregon, was divided into two parts to conform with Forest Service regional boundaries. Blister rust control work in Oregon and Washington will be handled hereafter by the Forest Service, Region 6, Portland, Oregon through a newly organized section in the Division of Timber Management. A Blister Rust Control Unit of the Forest Service, Region 5, has been organized to provide leadership and administration for control work in California. This Unit will continue to handle work on state and private lands and the technical direction of control work of all agencies.

RESEARCH A BASIC NEED OF THE CONTROL PROGRAM

Additional basic research is necessary particularly as to climatic and ecologic factors affecting rust behavior. A program of needed research in Oregon and California was outlined during 1953, and the initial steps were taken to implement this program in Oregon. Bureau officials worked with the Oregon state forester's office and with the Northwest Forest Pest Action Committee to get this research program under way. Similar steps will be taken to implement a research program for California. Studies undertaken earlier in Oregon and California to increase our knowledge of rust behavior were continued in 1953; significant results are beginning to accumulate.

In general 1953 was a poor spread year for blister rust from pine to ribes. Two previously unknown pine-infection centers were discovered in the vicinity of Pinecrest, Stanislaus National Forest, in the central Sierra Nevada, a discovery which extends known infection on sugar pine 20 miles farther south in California. Evidence is accumulating to show that intensification of the disease is taking place in the north and central portions of the State.

NEW CALIFORNIA LAW STRENGTHENS PEST CONTROL AUTHORITY

California revised its forest insect law to include the field of forest diseases. This law, as it now reads, gives the state forester full statutory authority to control forest insect and disease infestations on state and private lands whenever he determines the infestation or infection to be a menace to adjacent owners. Bureau personnel cooperated with the state forester in preparing the text of the law.

RECOMMENDATIONS

There are several potentially productive trends in the blister rust control program that should be given further impetus.

1. Better integration of forest management practices with blister rust control should be achieved. Specifically, continue work with private owners to interest them in establishing firm policies in the management of sugar pine.

2. Public agencies responsible for forest management should accelerate research on the silviculture of sugar pine.

3. Encourage progress in practical sugar pine management by Federal and State agencies.

4. Develop cheaper means of control and methods of applying control; maintenance types of inspection and treatment should be improved.

5. Full economic consideration of all forest pest control problems and protective programs should be made. The aim here would be to obtain better integration of all protective work on a strictly economic basis in order to maintain the maximum production of sugar pine.

6. Implement a comprehensive research program in both California and Oregon to obtain facts on rust behavior under varying climatic conditions.

7. Continue the search for rust resistant sugar pines for tree-breeding purposes.

DIRECTION OF THE PROGRAM

The Pacific Coast Project for the control of white pine blister rust is the cooperative undertaking of four federal agencies, two states and numerous lumber companies and timber owners. Each federal agency conducts control work on lands under its jurisdiction, while the states and private companies contribute funds or facilities, or cooperate in the work.

AUTHORITY AND RESPONSIBILITY DELEGATED BY CONGRESS

The Lea Act of 1940 authorizes the Secretary of Agriculture to use white pine blister rust control funds for the control of this disease on all forest lands, federal, state, and private. It provides, however, that at the discretion of the Secretary no such funds shall be expended for control work on state or private lands until sums at least equal in amount to the proposed federal expenditures on these lands have been made available, except where such state or private lands are so intermingled with those in federal ownership that control work on them is necessary to protect the federal lands. By the terms of the Agricultural Appropriations Act of 1950 the Bureau of Entomology and Plant Quarantine is responsible for leadership, coordination, and technical direction of the entire project. The Bureau is also charged with the over-all collection, summary, and presentation of pertinent statistical data. In accordance with these responsibilities it is necessary for Bureau personnel to work closely with representatives of the several participating agencies. This is accomplished through frequent discussions and conferences and continual contacts particularly during the field season.

LEADERSHIP PROVIDED BY BUREAU PROJECT OFFICE

The Bureau's Project Office at Oakland, California, takes the lead in organizing the control project in the States of California and Oregon. The project leader gives direction and supervision to the project and works actively with cooperating agencies and private industry on policies, financing and program planning. Three geographical areas have been established for the administration and conduct of the work. Each of these areas is under the direction of an area leader who acts as staff assistant to the project leader. Area I comprises work in Oregon and on the Klamath, Shasta, and Trinity National Forests and adjacent lands in extreme northern California. Area II comprises work on the Lassen Volcanic National Park, the Lassen, Plumas, Tahoe, Eldorado, and Mendocino National Forests, and adjacent areas. Area III encompasses the Stanislaus, Sierra, and Sequoia National Forests, the Yosemite and Sequoia-Kings Canyon National Parks, and adjacent areas. Each of these administrative areas is subdivided into several operations which are normally a national forest, park, or Bureau of Land Management district, each with adjacent state and private lands. An operation supervisor is in charge of project work on each operation. This staff of area leaders and operation supervisors assists the project leader with the technical direction of the project and the preparation of cost estimates, budgets, work plans, and records.

Educational activities are under the direction of a staff assistant. Motion pictures on blister rust were shown 26 times to an aggregate audience of 3,100 persons during 1953. Approximately 1,200 pieces of literature were distributed through various outlets. A permanent showcase exhibit was prepared for display at the main entrance to the Oakland Office. This display is suitable for use at fairs, conferences, and for other general educational purposes.

HAND ERADICATION METHODS USED EFFECTIVELY BY CONTRACTORS

Digging and pulling ribes by hand from areas selected for white pine management continued to be the principal method of accomplishing blister rust control on all operations. Procedures and methods for this type of eradication are modified to fit local conditions. Much of the ribes eradication is now being done under contract; on the majority of operations all ribes eradication was accomplished in this manner. During the 1953 season 48% of all area from which ribes were eradicated was worked by contractors. The project staff has devised specifications, inspection methods, and procedures to insure compliance with the terms of contracts. Procedures also have been evolved for training and instructing inexperienced contractors in proper ribes eradication techniques. Force-account hand eradication crews, operating out of camps, were employed principally by the National Park Service operations and on operations requiring a large amount of maintenance work. At the request of the National Park Service 150 men were recruited for blister rust work in the parks. Seasonal personnel recruitment is handled through the Project Office by a staff assistant.

CHEMICAL ERADICATION A VALUABLE SUPPLEMENTARY METHOD

The use of herbicidal chemicals 2,4-D and 2,4,5-T for ribes eradication is an accepted supplement to hand eradication methods. In a few areas of difficult hand working, because of soil conditions or extremely heavy concentrations of ribes, chemicals are used exclusively and are applied with power equipment.

MAINTENANCE WORK REQUIRES MODIFIED CHECKING PROCEDURES

Areas reach a maintenance condition after repeated ribes eradications and as ecological stability is approached. In this condition the pattern of ribes distribution and regeneration is different from that which existed formerly. The control problem becomes one of determining the practical level of tolerable rust damage and the location of scattered individual plants and small concentrations of ribes. The actual eradication job is negligible; the cost of finding the plants is greater than that of actually destroying them. By varying post checking methods and through the use of previous work records that show ribes distribution and regeneration patterns, ribes are being further reduced on maintenance and near maintenance areas.

IMPROVED CHECKING PROCEDURES STRENGTHEN CONTROL PRACTICES

Checking is the systematic sampling of control unit areas, either before or subsequent to eradication, to determine the number, size, and distributional patterns of ribes plants.

Checks made immediately following an eradication treatment serve to indicate if the specific work standard for that area has been met. Continued improvements in checking procedures aimed at increasing the accuracy of the basic data, determining reliability of the computed expressions of these data, and the over-all efficiency of the checking program are being made. This is being accomplished in the following ways:

1. Thorough training of checkers in all phases of their work prior to field assignments.

2. A weekly review of each checker's work together with a reexamination (rerun) of a portion of his check strips to determine adequacy of data.

3. Varying the percentage of sample. A formula for determining variability of ribes distribution is now being applied after a minimum sample has been taken; percentage of sample is then increased only if the variability is found to be excessive.

4. Strict adherence to established standards of satisfactory performance.

5. Special studies are being conducted to improve the accuracy of checking data. The results of one such study made during 1953 will be ready for publication in early 1954. This study was instituted when a critical analysis of 1951 and 1952 rerun data gave strong indications that the one-rod-wide strips then in use was not yielding checking data of desired accuracy. In particular it was found that checkers had missed a number of small ribes in outer portions of the strip. It appeared that a narrower sample area might have advantages, and a thorough testing of two tentative widths, 1/2 rod and 3/4 rod wide, was planned for the 1953 field season. During 1953 alternate operations used one or the other of the narrower strips. An intensive project-wide rerun program was instituted employing two outstanding checkers who devoted their full time to this activity. It is hoped that, in addition to establishing accuracy levels of trial strip widths and a basis on which optimum strip width can be selected, the reruns will provide a more reliable measure of uniformity throughout the project than had been possible previously. The field work of the rerun study was completed during the 1953 field season, and preliminary tabulation of data gives promise of useful and satisfactory results when the analysis is completed.

BLISTER RUST SPREADS TO CENTRAL STANISLAUS

Field observations made in 1953 indicate a poor spread year for the disease from pine to ribes. As a rule infected ribes were found only beneath sporulating cankers. Two previously unknown pine infection centers were discovered on the Stanislaus National Forest. These infections had originated in 1944, but no new cankers had been produced since that time. However, new cankers were found at an infection center on the Stanislaus which was discovered in 1952, giving evidence that intensification of rust on pine does occur in the central Sierra Nevada. Known limits of the rust on white pine is now at a point 264 miles south of the Oregon line . Intensive scouting of the southern portion of the Stanislaus National Forest failed to locate additional infection centers.

DISEASE SURVEYS TO REVEAL RUST DAMAGE

During 1953 Bureau personnel critically examined 17 well established high-hazard rust infection centers in northern California. Rust was present on all these areas prior to any eradication work. Eight of these centers examined are now located in selected management units on which some eradication work has been performed; the other nine centers are outside protective zones. Of 807 dominant and codominant sugar pine trees examined within the protective units, infection ranged from 0 to 9.3% with an average of 3.5%. On the nine centers outside protective units, 740 dominant and codominant sugar pine trees were examined with a range of infection from 0.8 to 45.1%. The average for this last group was 16.1%. These findings point up the need for early selection of management units and quick suppression of ribes on high-rust-hazard areas if existing young growth of sugar pine is to be retained in the stand.

SUGAR PINE MANAGEMENT STUDIES INTENSIFIED ON FEDERALLY OWNED LANDS

In line with 1952 recommendations for the project, federal agencies having land jurisdiction functions continued reappraisal of newly logged lands to determine the value of white pine stocking. Increased interest in white pine management was also notable during 1953. The Forest Service of Regions 5 and 6 are studying methods of securing natural white pine restocking as well as the releasing of residual stands of white pine reproduction. Region 6 widely tested spot seeding of tetramine-treated sugar pine seed. If this new rodenticide proves successful, it is likely that seeding will replace the more expensive tree planting on many cut-over areas.

Salvage pruning of white pine infected with blister rust was also tried out by the Forest Service in R-6. On an experimental basis, two pruning contracts were let, one on the Rogue River National Forest and one on the Umpqua National Forest. Trees were selected by permanent staff personnel, and the infected branches were pruned by the contractors to stipulated specifications. Approximately 4,150 trees were treated in this manner. Complete cost analyses are not yet complete, but preliminary results indicate that use of reliable hired labor capable of combining the functions of selection and canker removal would result in lower cost.

Region 6 Forest Service and Bureau personnel met during the summer to discuss increased correlation of timber sales, logging plans, and salvage operations with blister rust control work. Agreement was reached to hold inter-agency consultation during preliminary stages on all logging plans for white-pine-management areas.

STATE AND PRIVATE OWNERS SHOW INCREASED INTEREST IN SUGAR PINE MANAGEMENT

Elsewhere in the Pacific Coast region mounting interest in white pine management was evident during 1953. Evaluation of the State of California's Mountain Home Tract was completed by Bureau staff personnel. Within this tract 1,576 acres of state and federally owned lands qualified for management under the Vaux economic rating. Results of the evaluation and recommendations concerning control work will be forwarded to the State Division of Forestry. Bureau personnel, in cooperation with the

California Division of Forestry, qualified an area of 140 acres of western white pine type in Latour State Forest for management.

Following evaluation of their lands in 1952, the Southern California Edison Company selected 3,577 acres for sugar pine management and advanced $1,000 for control work. Initial eradication work was completed on about 1/3 of this area in 1953; the remaining area will be treated within the next two years. Officials of the Company conferred in the field with Bureau representatives and inspected work progress. This Company also completed pruning of 100 acres of second growth and is engaged in logging over-mature fir from the management areas.

On private lands no initial control work will be undertaken unless, first, sugar pine stands meet the Vaux economic criteria, and secondly, a management policy aimed at retaining sugar pine in the stand has been adopted by the owner. Thus far the Bureau of Entomology and Plant Quarantine has collaborated with some 18 large lumber companies and timberland owners, with most of whom satisfactory arrangements have been made with regard to sugar pine management practices. The aim is to fit application of blister rust control into the larger framework of sugar pine management, of which it is a vital part.

W-886. An entire family works on the job under the present practice of contracting ribes eradication. The two sons (left) assist their father with the digging while their mother places a string-line work boundary. Contracting ribes eradication has resulted in increased individual earnings of workers and has lowered government costs as much as 30%.

W-902. Early breakfast in a contracting crew's camp on the Lassen National Forest. Ribes eradication contractors operate their own camps and subsist themselves, thereby eliminating a costly item formerly supplied by the government for hired labor.

WORK ON STATE AND PRIVATE LANDS IN CALIFORNIA

Blister rust control work on state and private lands is the responsibility of the Bureau of Entomology and Plant Quarantine. The Bureau's staff administers control work in cooperation with the California Division of Forestry of the Department of Natural Resources, and private land owners. The State of California and private owners contribute funds or facilities and assist in long-range planning of the program.

STATE OF CALIFORNIA AND PRIVATE OWNERS MAKE WORK POSSIBLE ON PRIVATE LANDS

California, through appropriations of $168,000 for each of 1953 and 1954 fiscal years, provided a substantial part of the funds for control work on state and private lands. In addition, the California Division of Forestry assigned California Youth Authority wards from Dew Drop Camp in Amador County to this work. Their work is valued at $12,260 for 1953. Quality of work by the camp was good, and excellent cooperation was given by personnel of the California Youth Authority and the Division of Forestry. Owners of private timberlands contributed funds to the control program amounting to $3,350. These state and private monies, supplemented with federal matching funds, financed the work on state and private lands in 1953.

ERADICATION ACCOMPLISHMENTS MEET EXPECTATIONS

During 1953 ribes were eradicated from 18,530 acres. Contractors accounted for 75% of this acreage, 14% was accomplished by hired labor, and 11% by the Dew Drop CYA crew. An additional 6,071 acres were checked and met standards without working. Use of force-account labor for eradication work was limited to three small camps as follows: A 5-man unit operating from Bartle Guard Station on the Shasta National Forest used chemicals in power spray application for heavy ribes concentrations of initial working, a 12-man unit operated out of Hungry Creek on the Klamath National Forest primarily on maintenance work, and a 4-man unit engaged on clean-up work of isolated areas out of Spring Camp on the Lassen National Forest. Force-account labor still has a place in eradication work, particularly in extensive chemical eradication or in clean-up workings of areas light in ribes where checker-flanker teams are used.

Contractors were in adequate supply on all operations this year; as a result, bid prices were highly competitive. Average bid price of $3.90 per acre for eradication work on the Stanislaus National Forest is the lowest cost for work on state and private lands to date. The project-wide practice of allowing contractors to treat troublesome ribes bushes with the basal stem method of chemical application apparently lowered bid prices substantially on some specific areas.

Checking of control areas covered 56,972 acres during 1953. To facilitate this work three small administrative camps were operated by the Bureau. In addition to regular checking completed, sufficient advance and post checking was accomplished to allow work planning for 1954.

SELECTION OF AREAS IS BASED UPON ECONOMIC CRITERIA

Delineation of sugar pine areas continued in 1953. Evaluation of pine stands was completed for Latour State Forest in Shasta County and for Mt. Home State Forest in Tulare County. Some 46,000 acres of privately owned lands in the region were also appraised for sugar pine values, and of this area 24,000 acres qualified for management.

Good sugar pine management practices must go hand in hand with blister rust control. Accordingly the Bureau's staff engaged actively in a program of conferences and discussions with owners of private timberlands to emphasize the status and objectives of control work in relation to economics of growing sugar pine. A number of owners have cooperated with the Bureau on selection of areas and issuance of policy statements for establishing sugar pine management programs. Two companies, Southern California Edison Company in Fresno County and the Shasta Forests Company in Shasta and Siskiyou Counties, participated to the extent of allocating funds for control work. Policy statements and agreements were reached with Soper Wheeler Company in Butte, Plumas, and Yuba Counties, and with Craig, Adams, Finster, Sanford, and Knowlton in Placer County. In addition the Scott Lumber Company has tentatively agreed on area selection and has informally indicated a desire to participate financially.

INTEREST IN SUGAR PINE MANAGEMENT INCREASING

Meetings are scheduled for January 1954 with Collins Pine Company and the Diamond Match Company concerning sugar pine management policies on their extensive holdings. Both these companies are actively considering agreements. Diamond Match and Collins Pine engaged in rodent suppression on extensive areas of cut-over pine lands during 1952 to take advantage of a heavy sugar pine seed crop produced in the fall of that year. An excellent catch of sugar pine seedlings occurred on these treated areas in the spring of 1953. Many seedlings survived the dry summer of 1953 on the Diamond Match cut-over areas, but only fair survival resulted on the Collins Pine lands. Soils were radically different on the two ownerships, and it is the general opinion that soil moisture factors accounted for the difference in survival rates. Difference between seedling catch on poisoned and adjacent non-poisoned areas was striking in both instances. Both companies are cutting to favor sugar pine and yellow pine whenever possible and are leaving fine residual stands for future harvest. Other timber owners are moving in this direction.

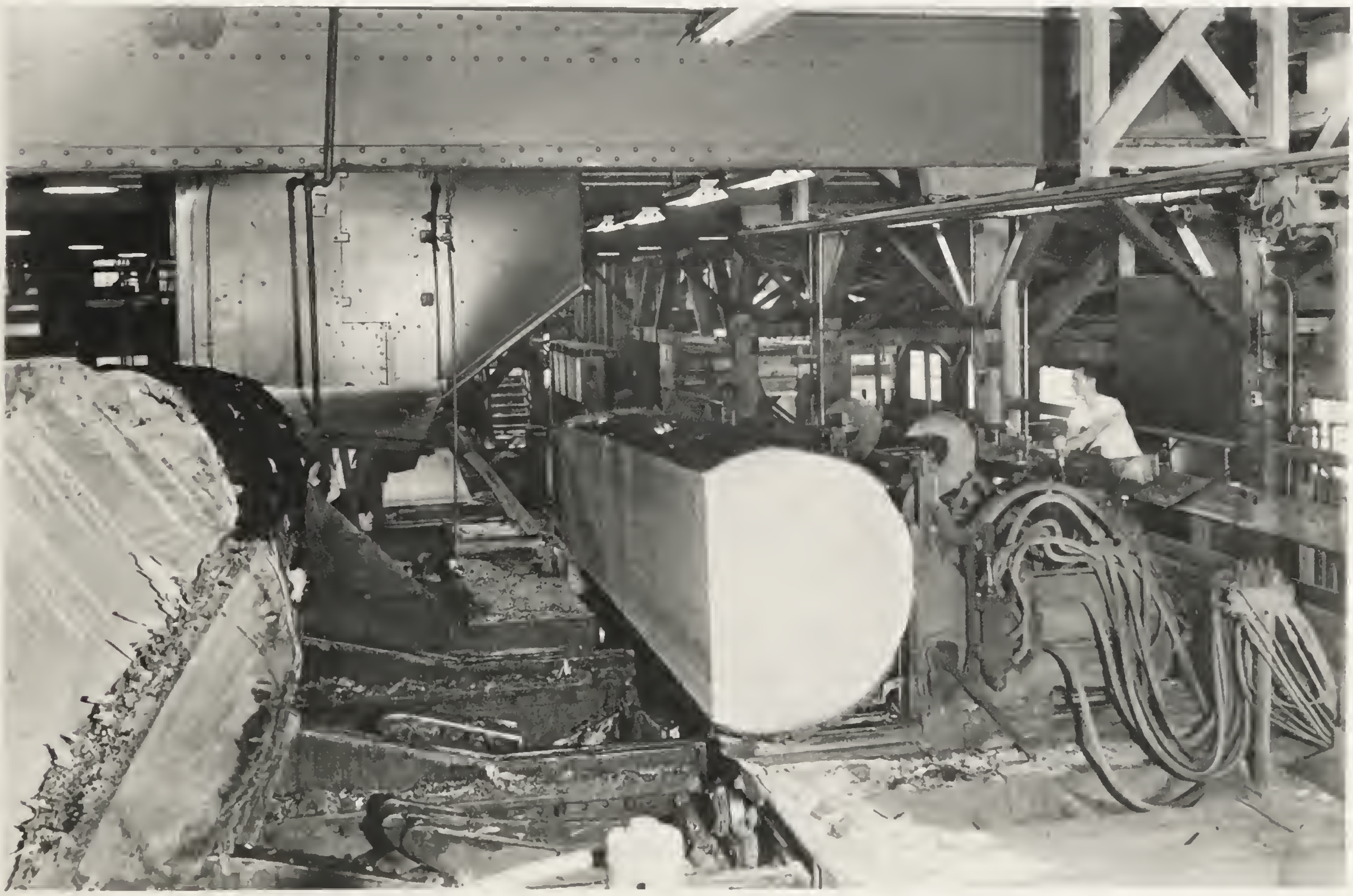
The entire field of sugar pine management and blister rust control problems was presented at the annual field meeting of the Northern California Section of the Society of American Foresters. Demonstration areas and infection centers were visited and inspected by those attending.

RECOMMENDATIONS FOR THE FUTURE

The expressed objective of blister rust control work in this region is the adequate protection of a sugar pine crop produced either for commercial or aesthetic use. The fulfillment of this objective necessitates the continuance of certain basic policies: (1) Encouragement of owners of timberland to follow management practices that will increase white pine

stocking and quality; (2) Reappraisal of newly logged lands to determine existing stocking as weighed against cost of control; (3) Correlation of forest management activities with blister rust control in order that ribes eradication can be timed most effectively, and that the natural ribes suppression resulting from certain management practices can be fully exploited; (4) Eradication of ribes from all high-rust-hazard areas within sugar pine management units as rapidly as possible; (5) Expansion and development of maintenance types of working, such as checker-flanker, to secure desired results at minimum cost.

W-952. This is the modern saw mill of the Michigan-California Lumber Company at Camino, California, in the heart of the sugar pine-producing belt. Private lumber companies operating well-managed forest properties contribute permanence and economic stability to the community and the entire lumber industry.



W-969. A splendid specimen of sugar pine is sawed into premium quality lumber by one of the high-speed head saws of the Michigan-California Lumber Company. An even larger log at the left awaits its turn to be rolled onto the carriage. This Company ships sugar pine products to all parts of the United States.

The U. S. Forest Service in Regions 5 and 6 conducts blister rust control programs in sugar and white pine stands on national forest lands of California and Oregon. The Forest Service selects areas for sugar pine management and formulates long-range timber management plans. Under the terms of a memorandum of understanding, the Forest Service in Region 5 (California) delegates to the Bureau of Entomology and Plant Quarantine responsibility of supervising ribes eradication work on national forest lands. In Region 6 (Oregon) the Forest Service has retained this responsibility. In both regions the Bureau's staff provides technical direction and performs the checking work.

ERADICATION ACCOMPLISHMENTS MEET SEASON GOALS

Region 5 accomplished ribes eradication work on 18,275 acres; an additional 8,049 acres were checked and found to meet control standards without working. The bulk of the work, 92%, was done by contract; the remaining 8% by force-account labor. A 12-man chemical eradication crew on the Plumas National Forest was engaged from mid-June to the end of July in the initial treatment of 100 acres supporting heavy ribes concentrations. A 25-man crew of Soledad Medium Security Prison inmates, located near Shaver Lake on the Sierra National Forest, hand eradicated ribes from approximately 500 acres of national forest cut-over land in that area. A 5-man crew, operating out of the Bureau's checking camp on the Stanislaus National Forest from late May to mid-July, treated heavy ribes concentrations on 134 acres of old cut-over lands by a foliage application of 2,4-D chemicals. All other eradication work in Region 5 was accomplished by contractors.

Region 6 performed eradication work on 8,120 acres; 33% was done by contract and 67% by hired labor. An additional 1,805 acres of national forest land were checked and found to meet standards without requiring additional work. A 10-man camp on the Umpqua National Forest provided a base for checking and eradication activities on this forest. Force-account crews out of this camp eradicated ribes from 2,500 acres during 1953. Three separate management units were involved: Quartz Creek, Zinc Creek, and the South Umpqua Experimental Forest. The other force-account camp in Region 6 was located at Union Creek on the Rogue River National Forest. Fourteen men working out of Union Creek destroyed ribes on 2,970 acres; about half of this acreage was maintenance work.

One significant development in contracting ribes reeradication work came to the fore in Region 6 during 1953. Many control areas in Oregon are now reduced to very low ribes population levels, but because of extremely high-rust-hazard conditions they must still receive periodic treatments. Contracting on such areas is not proving to be the cheapest way of obtaining eradication of the few remaining bushes. The cost of laying out contract areas, preparing bids, administration, inspection for conformance to specifications, and clearing of payments to the contractor exceeds that of doing the same job by force account. As an illustration of the trend

away from contract work in Oregon only 16.5% was done under contract in 1953. In previous years from 50-75% of reeradication work was contracted. The exact breaking point between contracting and force-account methods has not been determined. However, 1953 experience indicates that about 10 ribes plants per acre is the dividing level. Further study is planned to learn the cheapest methods of performing eradication work on areas where ribes occurrence is under 10 per acre.

FOREST SERVICE POINTS UP WHITE PINE MANAGEMENT RESEARCH

The Forest Service is pointing up their white-pine-management program throughout the Pacific Coast region. In the South Umpqua Experimental Forest 2,300 acres of white pine forest lands have been dedicated to the study of the problems involved. This area supports some of the finest mature sugar pine in the world as well as excellent stands of young growth. A portion of the experimental forest has been surveyed intensively and forest condition classes mapped. Research into various phases of management under field operating conditions is being conducted on these condition classes. As an integrated part of management, blister rust is being controlled and the Bureau is actively engaged in this phase of the program. In addition to ribes eradication and inspection surveys, canker removal work is being carried forward. Pruning of cankers from selected trees was completed on 34 acres. Properly spaced trees are selected and marked with the object of obtaining 100-120 crop trees per acre which can be pruned free of existing blister rust infection. Actual pruning was done by contract, the trees having previously been recorded by form class, height and diameter, tagged and paint marked. Tags were turned in and the area inspected for completeness of work before payment was made. Some experiments with systemic poisoning of cankers has been undertaken.

Elsewhere in California and Oregon large scale tests of restocking and improving quality of white pine is being undertaken by the Forest Service. Those tests involve changes in marking and cutting practices to increase white pine composition, rodent control to enable restocking by seeding methods such as tetramine treated seed, release cuttings on Christmas tree sale areas, pruning and thinnings to favor pine; all this in addition to a sound economic approach to blister rust control.

FUTURE PLANS PERFECTED

Comprehensive long-range work plans have been prepared for control work on all national forests. Funds permitting, these plans should be prosecuted to a successful conclusion. Annual review and revision of these plans will be necessary to keep them in accord with development of the rust, progress of logging, and changes in forest practices.

RECOMMENDATIONS

1. That the Forest Service press actively the adoption of silvicultural and management measures for sugar pine on areas set aside for the management of the species.

2. That timber management and blister rust control be coordinated closely; specifically, that blister rust control operation supervisors and the timber sales force on the several national forests collaborate in planning timber sales and in scheduling logging and other management activities so that the cost of control be kept at the minimum.

3. That the delineation work be completed in 1954.

W-906. Two pole-size sugar pines are pruned by U. S. Forest Service crewmen on the Lassen National Forest in accordance with current management practice. Pruning promotes the growth of the highest quality clear lumber.

W-852. On the Rogue River National Forest in Oregon, selected areas are clear cut, burned and planted to white pine. Rows of 4-year-old white pines may be seen in the foreground of this photograph, indicating excellent survival and growth.

THE NATIONAL PARK PROGRAM

The National Park Service is conducting blister rust control programs for Crater Lake National Park in Oregon, and for Lassen Volcanic, Yosemite, and Sequoia-Kings Canyon National Parks in California. The purpose of these programs is the protection from blister rust of white pine stands having high recreational and aesthetic value. The Park Service selects and outlines protection areas and on Yosemite and Sequoia-Kings Canyon National Parks administers ribes eradication work. On Crater Lake and Lassen Volcanic Parks the Bureau of Entomology and Plant Quarantine has been doing the eradication work on a reimbursement basis. Technical direction and inspection services are provided by the Bureau for all the parks.

SUBSTANTIAL PROGRESS MADE IN 1953

Ribes eradication work during 1953 was performed only on Yosemite and Sequoia-Kings Canyon National Parks. Eradication accomplishments for the year included 14,285 acres from which ribes were destroyed, and an additional 2,810 acres inspected and found to meet established standards without working. Considering worked area only, 89% of the job was done by force-account labor; 4% was worked by contract; and 7% by checker-flanker teams. The latter was a maintenance or near maintenance treatment. During 1953 three 35-man project camps were located on Yosemite National Park, and three camps, varying from 20 to 60 men, were located on the Sequoia-Kings Canyon National Parks. These force-account camps acted as a base of operations from which both eradication and checking activities were conducted. Labor for these camps was recruited from colleges throughout the country, from local sources, and from the Sherman Institute for Indian youths at Riverside, California.

Of approximately 156,000 acres of white pine blister rust protective areas within the parks of this region 91% has had initial treatment to date; 63% of the total is now on maintenance; and another 10% is near maintenance. Ribes suppression is greatly simplified on park lands where absence of logging and protection from wild fire has allowed the forest to approach or attain ecological stability. Since major disturbances of soil and vegetative cover do not occur, regeneration of ribes is at a minimum.

With the completion this year of the chemical spray work on the Chagoopa unit of the Sequoia-Kings Canyon National Parks, no initial coverage remains to be done in the high-country protective areas in the Sequoia-Kings Canyon National Parks. The Tenaya Lake area on Yosemite was deleted from control consideration after a reappraisal by Park Service and Bureau officials. Some back-country work is slated for 1954 with initial work scheduled for the Chilnualna area of Yosemite and reeradication scheduled for the Mt. Whitney area of the Sequoia. However, the bulk of high-country working is completed.

CHECKING AND ERADICATION COMBINED INTO ONE OPERATION

Within the next five years much of the control work on the parks will be reduced to the checker-flanker method of ribes eradication. This method combines both checking and eradication activities. Two trained ribes eradicators flank the checker as he runs systematic strips through an area. The two eradicators, working wide on each side of the checker, examine all likely ribes sites and destroy any ribes encountered. This method of coverage applies where ribes populations average below 10 plants per acre and is restricted largely to ribes sites. The problem is to locate the acres or sites where ribes do occur. On these areas inspection and searching absorbs most of the cost of eradication. To date the checker-flanker method has proved to be the only practical way of attacking the problem. Better and more efficient methods of handling this problem are being sought. Several modifications show promise. In the meantime use of highly trained checker-flanker teams, maximum use of past records, and reference to soil and vegetative disturbance records will have to suffice.

FUTURE WORK POINTS TOWARD MAINTENANCE

The initial work remaining in the parks is all on Yosemite, and plans call for the completion of this initial coverage within the next five years. Three camps are planned for Yosemite for the 1954 season. Initial work is to be performed on the Chilnualna unit with a 35-man camp and reeradication work from Crane Flat and Chinquapin with 20 and 10 men respectively. Checker-flanker and spot work will predominate at the latter camp. Isolated work blocks will be outlined for future contract work. Sequoia-Kings Canyon National Parks will schedule a 50-man camp at Redwood Mt. for reeradication work and an 8-man reeradication camp on the Mt. Whitney unit during 1954. The Park Service program is well on its way towards completion and is well ahead of the rust.

W-1049. Young sugar pines in Yosemite National Park are being protected from blister rust under the conservation policies of the National Park Service.

W-1021. Big Trees Lodge, nestled against a background of giant Sequoias and sugar pines in Yosemite National Park, affords a resting spot for tourists in this popular recreational area.

Sequoia-Kings Canyon National Parks. A string of pack horses crossing a snow field in late June, bearing men, supplies, and equipment for the high-elevation camp on the Chagoopa Plateau. A splendid stand of foxtail pine in this area will receive protection against white pine blister rust.

The survey party camp near timber line on Chagoopa Plateau in the heart of the foxtail pine country of Sequoia-Kings Canyon National Parks. From this camp the surrounding area was mapped and typed in 1952. Initial ribes eradication work was completed in 1953.

THE BUREAU OF LAND MANAGEMENT PROGRAM

The Bureau of Land Management through its Medford District conducts a blister rust control program on federal lands in southwestern Oregon. Selection of sugar pine stands to be protected is based on economic criteria developed for this purpose by the Bureau of Land Management. Direction and general supervision of the work is a responsibility of the district forester. The Memorandum of Agreement between the Bureau of Land Management and the Bureau of Entomology and Plant Quarantine was continued in effect throughout the 1953 season. In brief this agreement provides for general direction of the control program by the Bureau of Land Management, and technical direction to be furnished by the Bureau of Entomology and Plant Quarantine. A sustained cooperative effort by the two agencies has resulted in a simple working arrangement which has increased the flexibility and efficiency of the control work. Field activities were conducted under the joint supervision of a Bureau of Land Management project superintendent and an operation supervisor from the Bureau of Entomology and Plant Quarantine. Temporary personnel required for the control program were recruited, employed, and subsisted by the Bureau of Entomology and Plant Quarantine; reimbursement for these activities was made periodically by the Bureau of Land Management.

CHECKER-FLANKER TEAMS CONTINUE EFFECTIVE WORK

A small camp was established in the vicinity of Grants Pass, Oregon. This camp was used as an administrative headquarters for the field work and as a base of operations for the small force-account eradication crew. Checker-flanker teams were used for the third consecutive year. This method is used to locate and destroy scattered ribes within the control areas. Data obtained from checker-flanker work facilitates the delineation of areas which can safely be eliminated from further treatment until such time as disturbance occurs. Treatment by checker-flanker crews was confined to the Selma and Pickett Creek units. Ribes in the more inaccessible areas and the more dense concentrations were destroyed by contract labor. The isolated Flat Top (Old Glory) unit was worked entirely by contractors, and treatment of the Swede Basin and Quartz Creek units was completed in the same manner.

ACCOMPLISHMENTS IN ERADICATION WORK ARE ON SCHEDULE

Approximately 15,000 acres were worked on the Bureau of Land Management project during 1953; 87% was worked by checker-flanker teams and the remaining 13% by contractors. An additional 7,300 acres were checked and found to meet control standards without eradication treatment.

REAPPRAISAL WORK IS EXTENDED

Re-evaluation and revision of Bureau of Land Management control areas to conform to present control concepts were continued in 1953. Considerable acreage unsuited to sugar pine management was deleted from control units. This reappraisal is complete on three units, and those units remaining will be revised prior to treatment. In the revised units, 34% of the control

areas is now on maintenance and will require no further treatment until disturbed. Approximately 50% will require one additional treatment before going on maintenance, and 16% will require two or more coverages. The status of ribes suppression on other units is roughly comparable.

RECOMMENDATIONS FOR FUTURE WORK

The camp near Grants Pass will be reactivated in 1954. Operating from this camp crews will complete treatment of the Pickett Creek unit. Contingent upon availability of funds and personnel, a second camp will be established in the Chrome Ridge-Bunker Hill unit. Re-evaluation and revision of these units will be completed during 1954.

W-854. A checker-flanker crew in action. This system of locating and eradicating ribes on areas of low population received a high degree of development in Oregon on the Bureau of Land Management project, U. S. Department of Interior. The checker in the center sets the course and records the ribes found by the two flankers.

W-993. A blister rust checker searches carefully for missed bushes following eradication of currants and gooseberries by contractors. Careful inspection of areas, which is an integral part of the control work, insures full protection to sugar pine stands.

TABLE 1

THE STATUS OF RIBES ERADICATION IN THE PACIFIC COAST PROJECT AS OF DECEMBER 31, 1953

Control Operation	White Pine Management Unit Acres by Ownership: Federal	Private	State	Protective Zone (No Ownership Indicated)	Blister Rust Control Unit: Total Acres	Acres Unworked	Status of Ribes Eradication — Net Acres by Working: Initial	Reerad.	Maint. Work	Acres on Maintenance
PART A - CALIFORNIA										
Work Done by Bureau of Entomology and State of California										
Mendocino		300			300	300				
Klamath		7,371	45		7,416		7,416	11,319	1,980	2,327
Shasta		1,841			1,841	977	864			
Lassen		95,978			95,978	32,937	63,041	66,465	185	12,702
Plumas		29,236			29,236	6,548	22,688	27,169		2,373
Tahoe		824			824	208	616			
Eldorado		42,120			42,120	7,431	34,689	51,906		3,005
Stanislaus		44,148			44,148	3,092	41,056	46,291		4,674
Sierra		10,708			10,708	3,080	7,628	6,341		250
Sequoia										
Latour Forest			1,553		1,553	1,097	456			
Blodgett Forest			1,160		1,160		1,160	2,320		
Calaveras Big Trees Park		120	1,748		1,868		1,868	3,527		1,359
Mountain Home Forest			688		688	688				
TOTALS		232,646	5,194		237,840	56,358	181,482	215,338	2,165	26,690
Work Done by Forest Service										
Mendocino	2,000				2,000	2,000				
Klamath	3,956				3,956		3,956	5,587	667	784
Shasta	4,239				4,239	942	3,297			
Lassen	11,602				11,602	3,007	8,595	6,986		501
Plumas	57,237				57,237	14,056	43,181	54,676		10,449
Tahoe	18,740				18,740	4,492	14,248			
Eldorado	35,655				35,655	9,479	26,176	22,803		1,374
Stanislaus	43,375				43,375	2,200	41,175	69,261		10,879
Sierra	43,611				43,611	15,868	27,743	25,840		500
Sequoia	6,393				6,393	5,332	1,061			
TOTALS	226,808				226,808	57,376	169,432	185,153	667	24,487
Work Done by National Park Service										
Lassen Volcanic N. P.	17,779				17,779		17,779	22,954		15,186
Yosemite	88,126				88,126	13,831	74,295	93,664	617	53,622
Sequoia-Kings Canyon	46,441				46,441	100	46,341	46,902	325	27,787
TOTALS	152,346				152,346	13,931	138,415	163,520	942	96,595
Work Done in California										
	379,154	232,646	5,194							
ALL CONTROL OPERATIONS		616,994			616,994	127,665	489,329	564,011	3,774	147,772
PART B - OREGON										
Work Done by Forest Service										
Umpqua	6,015			393	6,408	1,695	4,713	420		
Rogue	56,713	1,378		1,386	59,477		59,477	85,713	1,432	12,455
Klamath	1,615	592			2,207		2,207	4,424		
TOTALS	64,343	1,970		1,779	68,092	1,695	66,397	90,557	1,432	12,455
Work Done by National Park Service										
Crater Lake	3,782				3,782	150	3,632	1,561		3,371
Work Done by Bureau of Land Management										
Medford	59,607	25,101	637	10,350	95,695	4,248	91,447	68,350		11,319
Work Done in Oregon										
	127,732	27,071	637							
ALL CONTROL OPERATIONS		155,440		12,129	167,569	6,093	161,476	160,468	1,432	27,145
PART C										
TOTAL FOR ALL AGENCIES - PACIFIC COAST PROJECT										
Forest Service	291,151	1,970		1,779	294,900	59,071	235,829	275,710	2,099	36,942
National Park Service	156,128				156,128	14,081	142,047	165,081	942	99,966
Bureau of Land Management	59,607	25,101	637	10,350	95,695	4,248	91,447	68,350		11,319
BE&PQ and State of California		232,646	5,194		237,840	56,358	181,482	215,338	2,165	26,690
	506,886	259,717	5,831							
TOTALS		772,434		12,129	784,563	133,758	650,805	724,479	5,206	174,917

TABLE 2

SUMMARY OF RIBES ERADICATION IN THE PACIFIC COAST PROJECT - 1953

Agency	Control Operation	Class of Work	Acres: Worked	Acres: Checked & Meeting Standards Without Work	Acres: Total	Total Man Days	Thousands of Ribes Destroyed
BUREAU OF ENTOMOLOGY AND STATE OF CALIFORNIA	Klamath	Maint. Work	1,980		1,980	429	6
	Shasta	Initial	521		521	290	94
	Lassen	Initial	738	573	1,311	487	74
		Reeradication	2,686	1,537	4,223	1,104	90
		Maint. Work	185		185	18	1
		All	3,609	2,110	5,719	1,609	165
	Plumas	Initial	1,081	790	1,871	430	73
		Reeradication	2,577	1,522	4,099	928	183
		All	3,658	2,312	5,970	1,358	256
	Tahoe	Initial	497		497	10	63
	Eldorado	Initial	757		757	570	70
		Reeradication	3,666	342	4,008	1,741	178
		All	4,423	342	4,765	2,311	248
	Stanislaus	Reeradication	2,562	1,307	3,869	725	249
	Sierra	Initial	1,280		1,280	1,081	358
	ALL EQ-STATE	Initial	4,874	1,363	6,237	2,868	732
		Reeradication	11,491	4,708	16,199	4,498	700
		Maint. Work	2,165		2,165	447	7
		All	18,530	6,071	24,601	7,813	1,439
FOREST SERVICE	Klamath	Maint. Work	667		667	143	2
	Shasta	Initial	1,287	403	1,690	575	30
	Lassen	Initial	1,600	617	2,217	688	70
		Reeradication	361		361	114	9
		All	1,961	617	2,578	802	79
	Plumas	Initial	564	290	854	390	75
		Reeradication	1,776	1,380	3,156	655	80
		All	2,340	1,670	4,010	1,045	155
	Tahoe	Initial	4,021	2,443	6,464	2,498	438
	Eldorado	Initial	1,076	20	1,096	644	177
		Reeradication	1,608	300	1,908	602	107
		All	2,684	320	3,004	1,246	284
	Stanislaus	Initial	165		165	200	206
		Reeradication	1,511	2,096	3,607	664	144
		All	1,676	2,096	3,772	864	350
	Sierra	Initial	1,800		1,800	2,097	468
		Reeradication	778	500	1,278	418	74
		All	2,578	500	3,078	2,515	542
	Sequoia	Initial	1,061		1,061	664	134
	ALL FOREST SERVICE	Initial	11,574	3,773	15,347	7,756	1,598
		Reeradication	6,034	4,276	10,310	2,453	414
		Maint. Work	667		667	143	2
		All	18,275	8,049	26,324	10,352	2,014
NATIONAL PARK SERVICE	Yosemite	Initial	3,860	90	3,950	5,009	804
		Reeradication	1,302	304	1,606	2,207	505
		Maint. Work	617		617	95	1
		All	5,779	394	6,173	7,311	1,310
	Sequoia Kings-Canyon	Initial	2,122	1,550	3,672	987	195
		Reeradication	6,059	867	6,926	4,001	393
		Maint. Work	325		325	25	
		All	8,506	2,417	10,923	5,013	588
	ALL NATIONAL PARK SERVICE	Initial	5,982	1,640	7,622	5,996	999
		Reeradication	7,361	1,171	8,532	6,208	598
		Maint. Work	942		942	120	1
		All	14,285	2,811	17,096	12,324	1,898
ALL CALIFORNIA		Initial	22,430	6,776	29,206	16,620	3,329
		Reeradication	24,886	10,155	35,041	13,159	2,012
		Maint. Work	3,774		3,774	710	10
		All	51,090	16,931	68,021	30,489	5,351
FOREST SERVICE	Umpqua	Initial	2,394		2,394	465	29
		Reeradication	300		300	53	1
		All	2,694		2,694	518	30
	Rogue River	Reeradication	3,995	1,805	5,800	922	86
		Maint. Work	1,432		1,432	192	2
		All	5,427	1,805	7,232	1,114	88
	ALL FOREST SERVICE	Initial	2,394		2,394	465	29
		Reeradication	4,295	1,805	6,100	975	87
		Maint. Work	1,432		1,432	192	2
		All	8,121	1,805	9,926	1,632	118
BUREAU OF LAND MANAGEMENT	Medford	Initial	2,560	6,476	9,036	870	25
		Reeradication	12,510	850	13,360	1,153	16
		All	15,070	7,326	22,396	2,023	41
ALL OREGON		Initial	4,954	6,476	11,430	1,335	54
		Reeradication	16,805	2,655	19,460	2,128	103
		Maint. Work	1,432		1,432	192	2
		All	23,191	9,131	32,322	3,655	159
ALL CALIFORNIA - OREGON		Initial	27,384	13,252	40,636	17,955	3,383
		Reeradication	41,691	12,810	54,501	15,287	2,115
		Maint. Work	5,206		5,206	902	12
		All	74,281	26,062	100,343	34,144	5,510

TABLE 3

SUMMARY OF CHEMICAL WORK IN THE PACIFIC
COAST PROJECT - 1953

Control Operation	Agency	Acres Covered	Total Man Days	Thousands of Ribes Destroyed	Thousands of Gallons of Spray Used
Shasta	EQ-State	125	91	67	11
Rogue River	FS	70	20	3	-
Plumas	FS	100	182	51	21
Stanislaus	FS	134	157	201	67
Sequoia-Kings Canyon	NPS	3,395	959	117	9
Agency Totals	EQ-State	125	91	67	11
	FS	304	359	255	88
	NPS	3,395	959	117	9
Grand Totals - 1953		3,824	1,409	439	108
Accumulative Grand Totals - 1946-1953		14,601	14,590	14,935	1,951

TABLE 4
SUMMARY OF ERADICATION BY CONTRACT 1953

Control Operation	Agency	Acres Worked By Contractor	Man Days	Thousands of Ribes Eradicated	Average Price Per Acre Paid To Contractor
All Workings (Initial and Reeradication)					
California Shasta	EQ-State	356	170	27	$9.91
	FS	1,207	426	30	6.77
	Total	1,563	596	57	7.48
Lassen	EQ-State	3,206	911	148	6.56
	FS	1,961	552	79	7.95
	Total	5,167	1,463	227	7.08
Plumas	EQ-State	3,658	1,040	256	7.48
	FS	2,240	642	104	6.45
	Total	5,898	1,682	360	7.09
Tahoe	EQ-State	497	10	63	6.45
	FS	4,021	2,098	438	8.15
	Total	4,518	2,108	501	7.97
Eldorado	EQ-State	2,327	687	86	7.65
	FS	2,684	971	284	6.07
	Total	5,011	1,658	370	6.80
Stanislaus	EQ-State	2,562	582	249	3.90
	FS	1,542	526	149	5.14
	Total	4,104	1,108	398	4.36
Sierra	EQ-State	1,280	993	358	7.92
	FS	2,052	1,399	364	10.34
	Total	3,332	2,392	722	9.41
Sequoia	FS	1,061	544	134	12.61
Yosemite	NPS	364	368	65	18.16
Seq-Kings Can.	NPS	245	300	146	22.66
Oregon Umpqua	FS	200	58	5	5.46
Rogue River	FS	2,457	605	61	5.21
Medford	BLM	1,904	960	35	7.28
Agency Totals	EQ-State	13,886	4,393	1,187	6.70
	FS	19,425	7,821	1,648	7.40
	NPS	609	668	211	19.97
	BLM	1,904	960	35	7.28
Grand Total - 1953		35,824	13,842	3,081	7.33
Accumulative Grand Totals 1946-1953		176,484	61,211	11,336	$5.89

TABLE 5

SUMMARY OF CHECKING IN THE PACIFIC COAST PROJECT - 1953

Control Operation	Agency	Acres Covered By Checks: Regular	Advance	Post	Total	Total Strip Acres	Total Checking Cost (Dollars)
California							
Shasta	EQ-STATE	701	100	-	801	35	1,228
	FS	2,345	2,240	-	4,585	150	2,583
Lassen	EQ-STATE	7,907	4,423	7,953	20,283	594	12,199
	FS	3,337	2,439	140	5,916	175	3,605
Plumas	EQ-STATE	7,121	2,161	4,195	13,477	256	6,398
	FS	4,647	1,448	2,761	8,856	170	4,245
Tahoe	EQ-STATE	478	30	-	508	21	165
	FS	6,262	4,445	1,483	12,190	364	7,441
Eldorado	EQ-STATE	4,131	75	4,669	8,875	264	4,023
	FS	5,143	1,600	4,355	11,098	365	5,543
Stanislaus	EQ-STATE	3,402	-	6,054	9,456	222	2,540
	FS	3,279	-	7,486	10,765	237	3,699
Sierra	EQ-STATE	2,603	-	969	3,572	104	1,581
	FS	3,871	627	5,801	10,299	239	3,618
Sequoia	FS	1,860	3,900	-	5,760	147	1,851
Yosemite	NPS	4,582	-	5,925	10,507	288	5,169
Sequoia-Kings Canyon	NPS	4,530	-	3,690	8,220	205	4,417
CALIFORNIA TOTALS		66,199	23,488	55,481	145,168	3,836	70,305
Oregon							
Umpqua	FS	2,136	1,749	-	3,885	257	1,246
Rogue River	FS	5,087	160	4,232	9,479	533	6,298
Medford	BLM	3,816	-	-	3,816	262	1,800
OREGON TOTALS		11,039	1,909	4,232	17,180	1,052	9,344
Pacific Coast Project							
AGENCY TOTALS	EQ-STATE	26,343	6,789	23,840	56,972	1,496	28,134
	FS	37,967	18,608	26,258	82,833	2,637	40,129
	NPS	9,112	-	9,615	18,727	493	9,586
	BLM	3,816	-	-	3,816	262	1,800
GRAND TOTALS		77,238	25,397	59,713	162,348	4,888	79,649

TABLE 1

FISCAL YEAR ALLOTMENTS FROM WHICH EXPENDITURES WERE MADE IN THE PACIFIC COAST PROJECT DURING THE CALENDAR YEAR 1953

Federal Funds

Agency	Fiscal Year 1953	Fiscal Year 1954*
Bureau of Entomology and Plant Quarantine	$ 203,700	$ 186,780
Forest Service Region 5 (California)	309,500	325,000
Forest Service Region 6 (Oregon)	62,990	70,000
National Park Service:		
Yosemite National Park	160,000	140,000
Sequoia-Kings Canyon National Parks	136,600	100,720
Regional Office	18,780	18,780
Bureau of Land Management	45,000	41,500
Total Federal Funds	$ 936,570	$ 882,780

Cooperative Funds

State of California	$ 168,437	$ 168,000
Michigan-California Lumber Company	2,000	2,000
Stockton Box Company	200	200
Edison Securities	-	500
Southern California Edison Company	-	500
Shasta Forests Company	-	150
Total Cooperative Funds	$ 170,637	$ 171,350
Total All Funds	$1,107,207	$1,054,130

* Figures in this column represent allotments as they are known as of December 31, 1953 and are subject to change until June 30, 1954.

TABLE 2

EXPENDITURES IN THE PACIFIC COAST PROJECT FOR THE CALENDAR YEAR 1953

Federal Funds

	California Fiscal Year 1953 1/1/53-6/30/53	California Fiscal Year 1954 7/1/53-12/31/53	Oregon Fiscal Year 1953 1/1/53-6/30/53	Oregon Fiscal Year 1954 7/1/53-12/31/53	Region Total
Bureau of Entomology and Plant Quarantine	$ 89,030	$ 98,027	$ 9,750	$10,140	$ 206,947
Forest Service Region 5	113,443	208,120	-	-	321,563
Forest Service Region 6	-	-	31,999	37,819	69,818
National Park Service:					
Yosemite National Park	40,360	108,845	-	-	149,205
Sequoia-Kings Canyon National Parks	30,445	74,956	-	-	105,401
Regional Office	9,179	7,571	-	-	16,750
Bureau of Land Management	-	-	17,619	16,365	33,984
Total Federal Funds	$282,457	$497,519	$59,368	$64,324	$ 903,668
Cooperative Funds					
State of California	$ 57,818	$102,289	-	-	$ 160,107
Michigan-California Lumber Company	2,000	2,000	-	-	4,000
Stockton Box Company	200	200	-	-	400
Edison Securities	-	500	-	-	500
Southern California Edison Company	-	500	-	-	500
Shasta Forests Company	-	150	-	-	150
Total Cooperative Funds	$ 60,018	$105,639	-	-	$ 165,657
Total All Funds	$342,475	$603,158	$59,368	$64,324	$1,069,325

TABLE 3

STATEMENT OF ALLOTMENTS BY FISCAL YEARS AND ACCUMULATIVE EXPENDITURES
FOR RIBES ERADICATION ON STATE AND PRIVATE LANDS

Fiscal Years	State of California Contributions			Private Cash Contributions	Total State and Private	BEPQ Allotments			Total State Private and Bureau
	Cash	Other	Total			3101.14 71.14 W-a.14 W-a.W W-a.4	3103.14 73.14 W-e.14 W-e.W W-e.4	Total BEPQ	
1942	$ 25,000	-	$ 25,000	-	$ 25,000	$ 61,370	$ 14,625	$ 75,995	$ 100,995
1943	25,000	-	25,000	$ 6,000	31,000	71,000	71,770	142,770	173,770
1944	50,000	-	50,000	6,000	56,000	82,825	86,195	169,020	225,020
1945	50,000	-	50,000	4,000	54,000	83,216	85,040	168,256	222,256
1946	75,000	$ 20,410	95,410	5,000	100,410	95,250	271,125	366,375	466,785
1947	75,000	74,860	149,860	5,000	154,860	137,022	563,000	700,022	854,882
1948	125,000	48,142	173,142	5,000	178,142	126,000	130,000	256,000	434,142
1949	153,125	43,044	196,169	5,000	201,169	136,459	115,440	251,899	453,068
1950	168,437	35,994	204,431	4,000	208,431	134,959	105,000	239,959	448,390
1951	168,437	26,237	194,674	2,200	196,874	137,000	100,000	237,000	433,874
1952	168,437	16,351	184,788	2,200	186,988	109,000	103,000	212,000	398,988
1953	168,437	8,237	176,674	2,200	178,874	109,700	99,000	208,700	387,574
1954	168,000	12,260	180,260	3,350	183,610	94,450	92,330	186,780	370,390
Totals	1,419,873	285,535	1,705,408	49,950	1,755,358	1,378,251	1,836,525	3,214,776	4,970,134
Accumulative Expenditures 7/1/41 to 12/31/53	$1,315,945	$285,535	$1,601,480	$49,950	$1,651,430	$1,343,504	$1,793,464	$3,136,968	$4,788,398

DEVELOPMENT AND IMPROVEMENT OF BLISTER RUST CONTROL METHODS IN THE PACIFIC COAST REGION FOR 1953

SECTION I. PROJECT STATUS AND HIGHLIGHTS OF 1953
By H. R. Offord, Project Leader

Project Status.

The need for continuous study of the costs and effectiveness of control methods has been recognized by blister rust control leaders since the inception of control work in the Far West 30 years ago. Since 1925, project status has been accorded the activities of the personnel assigned to control investigations in the Western States (California, Oregon, Washington, Idaho, Montana, Wyoming, and Colorado).

The general purpose of blister rust control investigations (known as the D.& I. Project) has been to develop and demonstrate more effective and economic methods of blister rust control. To these ends immediate work objectives have been: (1) the improvement of chemical, physical, and mechanical methods of ribes eradication including the development and adaptation of special equipment needed for this work; (2) the study of ribes ecology in relation to the status of rust control and to cutting and management practices in western white pine and sugar pine types; (3) field studies of the disease in relation to (a) control standards (number of ribes per acre and width of protective strip) and (b) the appraisal of pine losses caused by the rust including development of scouting and disease survey methods; (4). participation in the cooperative project for the development and testing of rust-resistant white pines; (5) testing of systemic and contact fungicides for the protection of nursery stock, young-age-class plantations or stands of natural regeneration; also testing of fungicides for killing branch and stem cankers on crop or ornamental pines.

In the conduct of the five principal lines of work just noted, the D.& I. personnel have been aided by and have worked closely with Blister Rust Control Project Leaders and their supervisors and other control specialists in the Bureau of Entomology and Plant Quarantine, and with other Federal and State Research agencies, chiefly the U. S. Forest Service, Bureau of Plant Industry, Soils and Agricultural Engineering, the University of California and the University of Idaho. The findings of the past 30 years work of D.& I. personnel are contained in 30 annual reports, 150 numbered project reports (known as Serial Reports), 4 public service patents, and 41 publications in U.S.D.A. and outside technical journals. For the fiscal year 1954, the D.& I. project in Entomology and Plant Quarantine, consisted of 3 project technicians at Spokane, Wn., 3 at Berkeley and Oakland, plus a project leader and secretary-clerk at Berkeley.

The investigations project has already accomplished much of direct value to control operations, but a great deal more needs to be done. The need for obtaining maximum volume of white pines from designated control areas will call for continuous study and critical appraisal first of pine management techniques, second, of methods and costs of ribes suppression in relation to approved management methods, and third, of the anticipated

pine losses from rust. Improvements and changes in white pine management can be expected to involve appropriate changes in blister rust control methods. The breeding and propagation of white pines with improved resistance to blister rust or improved adaptation to the drier or less hazardous portions of the white pine sites offers great possibilities for better management of the species. This development is necessarily a long term one which should continue to receive adaquate support. Studies on the ecology of the rust and the climatic factors affecting its virulence and distance of spread should have high priority in future research and control investigations in the western white pine and sugar pine regions. The application of this research to evaluation of the status of control and to control standards is a primary concern of blister rust control specialists. If the rust hazard could be accurately predicted, control costs could be sharply reduced in some areas, and losses of white pine minimized in others. Studies of the effect of local climate on rust spread and of the aerodynamics of blister rust spores, especially the fall-out and deposit of the blister rust sporidia (pine-infecting spores), would provide information that is urgently needed by control supervisors.

There is a great need to improve low cost and rapid methods of suppressing ribes by broadcast application of herbicides from aircraft and ground rigs. When it is realized that the economically important ribes of western white pine and sugar pine forests can, in actual fact, be killed by less than one dollar's worth of chemical per acre, there is every reason to expect significant improvements in these methods of direct ribes suppression. All that is needed to make such low cost work possible is a fully translocatable herbicide. At present we need complete coverage of mature ribes to be sure of kill with 2,4-D or 2,4,5-T. A tremendous amount of research on new herbicides is being done in this country, as well as abroad. Results of this work should be closely followed and the necessary field testing of new herbicides promptly undertaken.

New fungicides, especially those having systemic properties, should be noted and the more promising ones tested under field conditions. Such chemicals could contribute to the resistance of selected strains of white pine or to the short term protection of nursery stock and plantations where ribes suppression has not reached safe levels. The use of fungicides as a substitute for cutting cankers from crop trees also holds promise of lowering control costs.

In the overall appraisal of the needs and objectives of blister rust control investigations the broader picture of forest pest control should be kept clearly in mind. In dealing with managed stands, especially young stands established by planting, direct seeding, or by cutting, it would seem logical to employ as many single package methods as possible in scheduling protection work. Thus ribes and other undesirable vegetation could be scheduled for suppression at the time best suited for pest control and for vigorous growth of the trees being established. Also, suitable mixtures of fungicides, and fertilizers if needed, insecticides, or any combination of these protectants with herbicides might well be applied in a single operation or in the fewest possible treatments. The ultimate objective of blister rust and related pest control work must always be to serve the best interests of productive and effective use of forest land.

Highlights of 1953.

The development and improvement of blister rust control methods in sugar pine areas of California and Oregon were continued by Quick, Miller, and Burrill as detailed in Sections II, III, and IV of this report.

During 1953 emphasis was placed on disease studies designed to provide much needed information on the adjustment of control standards to the rust hazard of the particular forest tract under consideration. A disease study crew of 3 men extended the ribes-free zone of the 189-acre Prospect plot, Rogue River N.F., by working another 126 acres around the southwest corner of the plot. A similar crew extended the one-acre disease study plot at Goat Creek, Lassen N.F., to 48 acres. At Goat Creek the spread and development of the rust in a medium hazard site will be studied in a 10-chain protection zone in contrast to the 40-chain zone in the high hazard Prospect area. Results of scouting clearly show that rust spread during 1953 was moderately light. Infected sugar pine was found at Herring Creek and Dodge Ridge Ski Lodge, Stanislaus N.F.

Scheduled checks were made of ecology plots that have been providing information on the regeneration of ribes following logging, fire, grazing, and other disturbances including ribes eradication work. Special attention was directed to an analysis of data on physiographic, climatic, and vegetational factors affecting the ecology of the rust and of ribes. Galley for U.S.D.A. Circular No. 937, "Ecology and Control of the Sierra Nevada Gooseberry" by C. R. Quick, was corrected and returned to Washington.

The improvement of chemical methods involved checking of 282 plots established in 1952 and making 175 additional tests during the 1953 field season. Findings from the 1952 plots and observations of control operations spray work provided additional evidence that (1) a high emulsifier formulation of a mixture of the butoxyethanol esters of 2,4-D and 2,4,5-T at 500 p.p.m. total acid, costing about one-third of the presently recommended spray mixture, should be effective on the northern form of _Ribes roezli_; (2) the sodium salt of 2,4-D in water solution provides a more effective and cheaper foliage spray for _R. roezli_ in the central Sierra Nevada than the isopropyl ester; (3) the concentration of oil-ester 2,4-D, or mixture of the 2,4-D and 2,4,5-T, may be safely reduced from 5% to 3% acid content for most basal stem work; (4) 2,4,5-T applied as a foliage spray or basal stem treatment is effective on _R. montigenum_, but for best results attention must be given to seasonal development of the ribes and to the training of crewmen so that thorough coverage of the plant is obtained.

Noteworthy tests of 1953 included further work with 2,4-D and 2,4,5-T in dry pellet form, with soil sterilants such as the phenyldimethyl urea compounds and with a new herbicide, aminotriazole. The latter compound by itself is not effective in killing ribes but may combine effectively with 2,4-D. Rosin amine D pentachlorophenate and calcium sulfamate were specially formulated to serve as fungicides for killing traces of mycelium left in the main stem or branches after excising or pruning of infected pine tissue. Field tests on sugar pine and western white pine were made with these formulations in California, Oregon, and Idaho.

FISCAL YEAR ALLOTMENTS FROM WHICH EXPENDITURES WERE MADE BY THE DEVELOPMENT AND IMPROVEMENT PROJECT DURING THE CALENDAR YEAR 1953

Federal Funds

Fiscal Year 1953	Fiscal Year 1954
$53,600	$52,700

Expenditures by the Development and Improvement Project for the Calendar Year 1953

Fiscal Year 1953	Fiscal Year 1954	
1/1 to 6/30/53	7/1 to 12/31/53	Total
$25,346	$27,259	$52,605*

*Expenditure distribution by states

California	$21,042
Idaho	15,781
Montana	2,630
Oregon	5,261
Washington	7,891
	$52,605

SECTION II. RIBES ECOLOGY IN CALIFORNIA AND SOUTHERN OREGON, 1953
By C. R. Quick

In comparison with former years, more time in 1953 was spent on the ecological aspects of the rust and less time on the previously established ribes ecology plots.

Interpretations of statistical analyses of pine infection data from the Prospect (Oregon) disease-study plot were summarized in a brief memo. dated February 27, 1953. A botanical and ecological study of known pine infection areas on the Lassen, Plumas, and Stanislaus operations was made during parts of July, August, and October. Results of this study were reported in a memo. dated October 29, 1953, entitled "Search for plant-indicator species on blister rust infection areas." A study of certain broad physiographic aspects of pine infection areas, suggested by the botanical study, culminated in the following memos: "Notes and data concerning fog formation in the mountains" (9/17/53); "Ecological aspects of infection areas" (10/8/53); and "Experimental statistical analysis of selected physiographic factors associated with blister rust infected areas on the Eldorado operation" (12/2/53). These several units of work suggested leads that should be developed further than has been possible in 1953.

ECOLOGIC ANALYSIS OF INFECTED AREAS

Established ribes ecology plots may be considered as those which have long-term objectives concerned with seedling occurrence and seedling establishment, with rate of ribes growth, with age and vigor of fruiting, and with plant and population decadence. These ribes characteristics have been studied on burns, on control areas variously logged, on matched subplots inside and outside of grazing exclosures, and on areas from which the ribes have been removed by a variety of methods. Reference should be made to past annual reports and to D&I serial reports for information on ecology studies not discussed herein.

RIBES PLOT OBJECTIVES

<u>One-Acre Regeneration Plots</u>.

One aspect of ribes ecology of primary importance in any long-term consideration of blister rust control is an understanding of intensity and duration of seedling occurrence on control areas with varied ecologic histories, which have been subjected to different kinds and degrees of disturbance. This type of data has been collected from many plots representing a variety of ecologic conditions. The principal disturbances studied have been logging, wild fire, grazing, and the eradication of dense populations of gooseberries. The type, intensity, and timing of such disturbance are important. Whether ribes suppression was initiated long before, just before, just after, or long after the major disturbance is especially important whenever the control of ribes seeds "stored" in the forest floor is involved. One aspect of this problem not yet sufficiently defined by plot data is the intensity and duration of seedling occurrence on heavily logged areas from which ribes were initially eradicated some years prior to the logging, and which have been kept free of fruiting ribes subsequent to logging. The Shaver Lake one-acre plot (Sierra N.F.) is yielding important data bearing on this point.

REGENERATION PLOT STUDIES

Table 1, herewith, summarizes some data collected from the Shaver Lake plot, 1950-1953. Similar data are reported in table 6, annual report for 1949, and table 6, annual report for 1948. This plot also has been described in some detail in BRC-D&I Serial Report No. 134 (Jan. 14, 1947). When the current crop of gooseberries on this plot first produce fruit, perhaps in 1954, all ribes plants will be removed. Notice that at the present time, 15 years after initial ribes eradication in 1938, and 12 years after logging in 1941, active ribes regeneration is largely restricted to 1/5 of the plot area. The most actively regenerating portion of the plot is the most severely disturbed part. Table 2 shows, furthermore, that subdivisions of the "active" 1/5 of the plot acre have produced significantly different numbers of ribes seedlings. The increase in numbers of current-season seedlings, 1950-1953, is not now fully explicable, but additional years of data from the plot should resolve this apparent inconsistency.

MANY RIBES SEEDLINGS

The objectives of the Fanianni one-acre plot, west of Lake Almanor (Lassen N.F.) are closely similar to those of the Shaver Lake one-acre plot. This latter plot has been described in BRC-D&I Serial Report No.148 (Nov. 29, 1950), and in the 1949 and other annual reports. Status of the eight plots which make up the one-acre regeneration series is given in the 1951 annual report.

Denuded Plots.

Starting in 1937 several series of small plots have been established on control areas rather completely denuded of vegetation by various types of logging, by other mechanical disturbance (such as fireline preparation by bulldozer), by various types and intensities of fire, and by complete hand removal of dense brush. The general objectives of this series of plots are (a) to determine how long denuded areas of described ecologic conditions will continue to produce annual crops of new ribes seedlings, (b) to determine how other plants and vegetation develop with respect to the ribes, (c) to determine when establishment of additional ribes seedlings is more or less precluded, and (d) to determine when the vegetative growth of individual ribes plants begins to decline. Whenever possible ribes control should be initiated where few or no additional ribes seedlings subsequently will become established in a specific type, age, and density of vegetation. At such a time one thorough initial eradication of ribes plants should put a control area on "maintenance."

OBJECTIVES OF DENUDED PLOTS

An additional denuded plot was established in 1952 on Big Bar Mt. (Plumas N.F.) on the edge of the Feather River conflagration (Grizzly Creek Burn) of 1951. See pp. 37 and 39, annual report for 1952. Table 4 summarizes the data collected in 1953. When inspected in 1953 the most abundant plant species, in order of abundance of milacre quadrats stocked, were white fir, deerbrush, thimbleberry, gooseberry, big-leaf maple, and currant. Table 3 summarizes numbers of plants and amount of growth on the gooseberries and currants which have developed on the 25-milacre plot since the 1951 burn.

A small plot similar in nature to the denuded plot described above was initiated in 1937 on Chowchilla Mt. (Sierra N.F.) on a logged area from which a great many ribes plants had been initially removed with hand

tools in late summer, 1935. At annual inspections the current-season gooseberry seedlings were counted and left on the studied area, while the one-year-old seedling-origin gooseberry plants were removed and counted. See table 5. This procedure gives a good estimation of one-year survival of gooseberry seedlings, and of the variations of this percent of survival with time, with development of other vegetation, and with cyclic variations of climate. With passing years this area became very brushy, largely through the development of a dense stand of snowbrush (Ceanothus cordulatus) with occasional openings. Data from the six subplots of this 24-milacre plot (table 5) illustrate the considerable variation of seedling occurrence and survival within very short distances.

SEEDLING SURVIVAL

In June 1951 all brush was carefully removed by hand from this plot and from a narrow isolation strip around it. The upward surge in numbers of current-season gooseberry seedlings in 1952 and 1953 is believed due to this removal of brush. Statistical analyses should be undertaken to show the trends in seedling occurrence data and seedling survival data collected from this plot.

Table 1. Ribes plants on Shaver Lake one-acre plot, 1950-1953.

Inspection		Number of plants by estimated years of origin							Total ribes found	Estimated* live stem, inches		
Date	Year Day	1953	1952	1951	1950	1949	1948	1947		CSS	OLS	TLS
Subplots 1-8 (0.8 acre)												
1950(Aug. 16)	228	--	--	--	3	--	--	--	3	0.5	---	0.5
1951(July 28)	209	--	--	16	--	--	--	--	16	3.9	---	3.9
1952(Aug. 8)	221	--	19	4	--	--	--	2	25	6.0	5.3	11.3
1953(June 22)	173	124	4	2	--	--	--	1	131	9.4	6.4	15.8
Subplots 9-10 (0.2 acre)												
1950(Aug. 16)	228	--	--	--	107	7	--	--	114	55.0	14.5	70.0
1951(July 28)	209	--	--	307	55	9	1	--	372	326.8	51.5	378.3
1952(Aug. 8)	221	--	392	77	31	10	2	--	512	785.6	255.5	1041.1
1953(June 22)	173	1310	157	66	15	3	3	1	1555	353.8	609.2	963.0

*Current-season stem, older live stem, and total live stem.

Table 2. Ribes current-season seedlings on one part (0.2 acre) of the Shaver Lake one-acre plot, 1950-1953

Sub-plot*	Number of seedlings found at inspection: Aug. 16 1950	July 28 1951	Aug. 8 1952	June 22 1953	Four-year mean
A9E	12	16	8	80	29
B9E	8	28	29	95	40
A9W	8	16	20	80	31
B9W	56	71	116	195	110
A10E	14	74	42	230	90
B10E	5	57	128	165	89
A10W	3	28	9	205	61
B10W	1	17	40	260	80
Totals	107	307	392	1310	529

*Each subplot, e.g., A9E, is 1/2 by 1/2 chain, i.e., 1/4 square chain, or 1/40 acre.

Table 3. Ribes plants and live-stem on Gentle Gully denuded milacres, Big Bar Mt., Plumas N.F., 1952-1953

Date of inspection	Year of seedling origin	Number of plants	Estimated linear inches of live stem *: CSS	OLS	TLS
RIBES NEVADENSE (SIERRA NEVADA CURRANT)					
9/6/52	1952	12	9.0	0.0	9.0
6/30/53	1952	10	57.5	7.5	65.0
"	1953	2	0.1	0.0	0.1
"	All	12	57.6	7.5	65.1
RIBES ROEZLI (SIERRA NEVADA GOOSEBERRY)					
9/6/52	1952	24	40.9	0.0	40.9
6/30/53	1952	23	347.1	44.1	391.2
"	1953	9	1.0	0.0	1.0
"	All	32	348.1	44.1	392.2
BOTH SPECIES (GOOSEBERRIES AND CURRANTS)					
9/6/52	All	36	49.9	0.0	49.9
6/30/53	All	44	405.7	51.6	457.3

*Current-season stem, older live stem, and total live stem.

Table 4. Seedlings and resprouts found June 30, 1953, on Gentle Gully (fireline) denuded milacres, Big Bar Mt., Plumas N.F.

Code	Plant species	Current season seed-lings	Older seed-lings	Re-sprout stems	Total stems	Mil-acres stock-ed
DF	Douglas Fir	1	4	1	6	5
IC	Incense Cedar	0	1	0	1	1
PP	Ponderosa Pine	0	1	0	1	1
SP	Sugar Pine	0	1	0	1	1
WF	White Fir	0	220	0	220	25
BLM	Big-Leaf Maple (Acer.macrophyll.)	0	14	1	15	14
BO	Black Oak (Q. kelloggi)	0	2	80*	82	3
CN	Dogwood (Cornus nuttalli)	4	10	0	14	8
TBO	Tan-bark Oak (Lithocarpus)	0	2*	85*	87	4
AP	Manzanita (Arctos. patula?)	4	1	0	5	3
CI	Deerbruch (Cean. integerrimus)	12	40	0	52	16
CR	Hazelbrush (Corylus rostrata)	0	0	7	7	3
SG	Elderberry (Sambucus glauca)	0	1	0	1	1
SS	Willow (Salix scouleriana?)	0	3	0	3	2
RN	Currant (Ribes nevadense)	2	10	0	12	9
RP	Thimbleberry (Rubus parviflorus)	10	7	Many	Many	16
RR	Gooseberry (Ribes roezli)	9	23	0	32	15
RS	Ground Rose (Rosa spithamea)	0	0	1	1	1
SM	Waxberry (Symphoricarpos)	3	0	Many	Many	7
CP	Harebell (Campanula prenanth.)	6	0	8	14	8
DF	Bleeding Heart (Dicentra formosa)	4	0	6	10	3
IH	Sierra Iris (Iris hartwegi)	0	8	0	8	7
PA	Bracken (Pteris aquilina)	0	0	70	70	8
SA	Solomon (Smilacina)	1	0	8	9	3
VL	Pine Violet (Viola lobata)	0	0	12	12	5

*Removed from plot at inspection.

Table 5. Occurrence and one-year survival of gooseberry seedlings, Plot EF (24 milacres), Chowchilla Mt., Sierra N.F., 1937-1953

Date of inspection	Year day	Current-season seedlings left on subplots ≠≠							One-year-old seedlings removed from subplots ≠≠							One-year survival, percent
		UL	UR	ML	MR	LL	LR	Total	UL	UR	ML	MR	LL	LR	Total	
7/24/37*	205	54	578	1750	388	2310	2925	8005	94	247	662	989	425	459	2876	----
7/25/38	206	115	415	455	635	825	1015	3460	--	--	--	--	--	--	--	----
6/23/39	174	280	465	1555	1085	955	1305	5645	21	60	141	163	134	286	805	23.3
6/10/40	162	190	225	455	260	220	640	1990	43	155	177	210	130	223	938	16.6
6/26/41	177	106	177	275	176	124	247	1105	15	25	14	20	3	15	92	4.6
Means	185	149	372	898	509	887	1226	4041	43	122	248	346	173	246	1178	16.5 ≠
7/9/42	190	42	80	147	156	104	224	753	19	17	38	25	6	30	135	12.2
6/17/43	168	33	13	102	48	69	68	333	3	13	5	24	2	18	65	8.6
6/17/44	169	48	91	160	112	147	208	766	7	7	14	19	5	9	61	18.3
6/13/45	164	31	64	138	88	117	152	590	5	17	11	15	3	12	63	8.2
7/4/46	185	12	45	56	48	55	135	351	4	21	18	19	2	19	83	14.1
Means	175	33	59	121	90	98	157	559	7.6	15.0	17.2	20.4	3.6	17.6	81.4	11.5
6/18/47	169	2	4	27	3	9	23	68	0	3	8	4	1	4	20	5.7
7/27/48	209	0	10	6	6	3	22	47	1	3	7	5	2	7	25	36.8
7/9/49	190	3	4	18	13	39	44	121	1	1	1	0	2	3	8	17.0
6/6/50	157	3	2	21	4	22	26	78	0	0	4	1	6	10	21	17.4
6/16/51	167	0	2	9	7	9	7	34	0	0	2	2	1	1	6	7.7
Means	178	2	4	16	7	16	24	70	0.4	1.4	4.4	2.4	2.4	5.0	16.0	12.0
6/20/52	172	9	13	79	71	48	137	357	0	0	1	0	0	0	1	2.9
8/14/52	227	0	1	25	22	4	36	88	--	--	--	--	--	--	--	--
6/19/53	170	23	13	148	130	66	227	607	0	0	19	19	1	29	68	19.0
Means**	171	16	13	114	100	57	182	482	0.0	0.0	10.0	9.5	0.5	14.5	34.5	17.6

*Half of subplots inspected on 9/6/37. All ribes removed at this inspection.

**Data from inspection of 8/14/52 excluded.

≠ Based on seedlings of 1938-1940 origin only.

≠≠ The plot is 0.4 by 0.6 chains. Each subplot is a group of 4 milacres. UL = upper left; ML = middle left, LR = lower right, etc.

SECTION III. DEVELOPMENT OF IMPROVED HERBICIDES FOR RIBES ERADICATION WORK.

By C. R. Quick and W. S. Burrill

Testing of herbicides for the control of ribes continued through 1953 on experimental lines similar to those of previous years but on a smaller scale. The scope of this developmental work had to be geared to the available time of the permanent staff unaided by seasonal help.

EMPHASIS ON HORMONE-TYPE HERBICIDES

Emphasis again was on hormone-type herbicides. The several series of experiments may be briefly outlined as follows: (1) comparisons of basic chemicals such as 2,4-D (2,4-dichloro-phenoxyacetic acid), 2,4,5-T (2,4,5-trichloro-phenoxyacetic acid), and MCP (2-methyl-4-chloro-phenoxyacetic acid); (2) comparisons of various chemical forms of these basic hormone-type herbicides, such as the acids, sodium salts, amine salts (triethanolamine salt), short-chain esters (isopropyl ester), several long-chain esters, and other miscellaneous forms; (3) comparisons of general methods of application involving materials in dilute aqueous sprays applied to foliage, materials in oil solutions for basal-stem sprays, and materials in the solid state (dry powder or pellets) for distribution by hand or by aircraft; (4) comparisons of specific commercial formulations; (5) comparisons of various types of additives used in the basic formulations, and (6) comparisons of effectiveness of active materials in terms of concentration of field solution in p.p.m. (parts per million) or in percent, weight of active herbicidal chemical per unit of plot area, or per unit of ribes livestem, and volume of herbicidal solution per unit of plot area or of ribes livestem.

COMPARISON OF 2,4-D FORMS

The relative merits of sodium and amine salts, and of short- and long-chain esters of 2,4-D in dilute-aqueous sprays for the treatment of Ribes roezli, the common gooseberry, have long been studied and discussed. Table 6 summarizes available data from tests made over the period 1946-1952. Figures for percentage bush kill in the table are not based on the same number of tests nor on a comparable number of bushes. Materials added to the field solutions, other than the major ingredients, also varied somewhat among the tests and series of tests. The percentages of bushes killed are based on total numbers of bushes treated. The bush-kill figures in the horizontal line of means indicate in general the resistance expected of the four classifications of ribes bushes (2 ages of bushes, and 2 seasonal stages of growth) to the killing action of the herbicides. Further analysis of these data is needed before they can be properly interpreted.

Results of 1952 Tests.

ATTEMPTS TO BREAK "SEASONAL EFFECT"

The "seasonal effect" in the treatment of gooseberry bushes with hormone-type herbicides in dilute-aqueous sprays is very marked. Bushes in the full-flush of spring growth are relatively easily killed, but treatments of similar bushes 4 to 6 weeks later often are much less successful. This results in a serious shortening of the effective season for use of dilute-aqueous sprays. Various series of tests in the past have attempted to obviate this short-coming of the dilute-aqueous

method. Addition to the spray solution of emulsifiers, penetrants, detergents, and other promising additives has been one line of attack on the problem. The partial success of a recent series of late-season tests with a special commercial formulation of mixed 2,4-D and 2,4,5-T plus spray additives is summarized in table 7. Notice that the mid-season treatments (6/30/52) are perfect, but that the late-season tests (7/29/52) still leave considerable to be desired. Results from this group of late-season tests, however, are considerably better than from many previous groups of late-season tests. It appears that the addition of Diesel oil and oil emulsifier in a high-emulsant formulation of 2,4-D and 2,4,5-T may be desirable in those areas where 2,4,5-T normally is added to spray solutions of 2,4-D. In control operations the use of ACP #977 at a total concentration of 500 p.p.m. would mean a chemical cost of about one-third of that now being spent for the previously recommended 1500 p.p.m. mixture of 2,4-D and 2,4,5-T.

RIBES CEREUM SUSCEPTIBLE TO CHEMICALS

Ribes cereum, the squaw currant, is not particularly susceptible to infection with blister rust, but the species often occurs in large concentrations of sizable clumps which can not be removed economically by hand eradication methods. Table 8 summarizes results of a series of basal-stem treatments on clumps of this currant. The damage to *R. cereum* on the Feather River Meadows plots looks much better than the data in the table indicate. Many live clumps of *R. cereum* on this area are represented by one or two small weak sprouts. Some of these sprouts will die before final plot inspections; other clumps may sprout. Following a routine operations treatment, the ribes suppression on this area would be considered entirely satisfactory. The relatively weak but still evident seasonal effect of the basal-stem treatment is apparent in the two series of treatments made on the Sequoia.

MCP vs. 2,4-D

MCP, in comparison with 2,4-D and 2,4,5-T, has been infrequently tested on gooseberries and currants. Although MCP has been favored for some special uses in general agricultural weed control, table 9 indicates that in comparison with similar 2,4-D herbicides it has little or nothing to offer in ribes eradication work. Some additional tests of MCP formulations were put out in 1953, and it is now believed that no further tests of MCP need be initiated on *R. roezli*.

Various other series of tests, especially basal stem treatments, were conducted in 1952, along the lines of experimentation outlined, in the introductory paragraphs, but they will not be presented in detail here.

Chemical Tests for 1953.

The tests initiated in 1953 are listed in table 10, but not evaluated. Observations on the effectiveness of herbicides on ribes the year that the tests are applied are not reliable. In general, from preliminary inspections of plot areas, the results of these 1953 tests look very promising.

Table 6. Comparison of bush-killing effectiveness of ten forms of 2,4-D in dilute aqueous sprays on Ribes roezli, 1946-1952

Commercial formulation trade name	Active growth stage		Past active stage growth	
	Young bushes	Old bushes	Young bushes	Old bushes
2,4-D Weed Killer (1)	*94:14(278)	----	49:31(388)	27:12(150)
Endoweed (2)	93:22(350)	----	55: 9(120)	----
2,4-Dow Weed Killer (3)	----	86: 8(161)	----	69: 5(188)
Stantox 40 (4)	100: 4 (97)	82:11(127)	40:15(200)	66: 8(102)
Killtox 40 (5)	----	83:10(139)	63: 4 (96)	27: 4 (82)
Weed-No-More (6)	91:14(339)	86: 8(108)	40: 6(114)	0: 4(107)
Stantox P-44 (7)	----	64: 7(110)	----	23: 3 (47)
Weedone LV-4 (8)	----	83: 7 (96)	47: 8(124)	23:18(326)
Esteron Ten-Ten (9)	----	89: 4 (66)	----	----
Estercide D-4 (10)	----	97: 4 (36)	----	----
Means	94:14(268)	82: 7(105)	48:12(174)	34: 8(143)

*The figure in front of the colon is percent of bushes killed; the figure after the colon is number of plots treated; and the figure in parenthesis is number of bushes treated.

(1) Ammonium salt; E. I. du Pont & Co., Inc.
(2) Sodium salt; Dow Chem. Co.
(3) Monohydrate sodium salt; Dow Chem. Co.
(4) Triethanolamine salt; Standard Agric. Chems., Inc.
(5) Triethanolamine salt; Veith Chem. Co.
(6) Butyl ester; Sherwin-Williams Co.
(7) Isopropyl ester; Standard Agric. Chems., Inc.
(8) Butoxyethanol ester; American Chemical Paint Co.
(9) Propylene glycol butyl ether ester; Dow Chem. Co.
(10) Tetrahydrofurfuryl ester; Calif. Spray-Chemical Corp.

Table 7. Comparison of bush kill from mid- and late-season applications of ACP #977* in dilute-aqueous spray on R. roezli, Plumas N.F., 1952

Time of application	Spray additives: Percent Diesel oil	Spray additives: Fl. oz. MF-L ≠	Percent of bushes killed by treatment with 2,4-D and 2,4,5-T, total concentration, p.p.m. AE, as shown: 250	500	750	1000	Mean
Mid-season (6/30/52)	2.5	0.5	100.0	100.0	100.0	100.0	100.0
Late season (7/29/52)	2.5	1.0	40.0	94.4	60.0	23.1	57.4

*ACP-977 is a formulation of 2,4-D (2/3 of total acid equivalent) and 2,4,5-T (1/3 of total AE) in the butoxyethanol ester form, with a high content of emulsifiers, made by Amer. Chem. Paint Co.

≠ MF-L is Multifilm-L, Colloidal Products Corp., an oil-emulsant spray additive; fluid ounces per 5-gallon batch of spray solution.

Table 8. Percentage of R. cereum clumps killed by basal-stem treatment with mixtures of 2,4-D and 2,4,5-T applied in 1952

Principal formulations*	3.75 percent AE: Woodward Creek, Sequoia N.F. 6/16/52	3.75 percent AE: Woodward Creek, Sequoia N.F. 8/5/52	3.75 percent AE: Feather R.Mdws. Lassen 7/31/52	7.50 percent AE: Woodward Creek, Sequoia N.F. 6/16/52	7.50 percent AE: Woodward Creek, Sequoia N.F. 8/5/52	7.50 percent AE: Feather R.Mdws., Lassen 7/31/52
Stantox P-44 and Stantox T-45 (1)	100.0	100.0	0.0	100.0	100.0	50.0
Esteron Brush Killer (2)	100.0	84.6	100.0	100.0	100.0	0.0
Weedone LV-4 and Weedone 245-T (3)	100.0	77.8	0.0	100.0	100.0	50.0
Brush Killer #3 (4)	100.0	81.8	---	100.0	93.8	---
Estercide D-4 and Estercide T4 (5)	100.0	90.9	0.0	100.0	75.0	0.0
Means	100.0	86.8	38.5	100.0	93.1	22.2

Total concentration of 2,4-D and 2,4,5-T.

*All formulations were diluted with Diesel oil. The acid equivalent in items 1, 3 and 5 was 2/3 of 2,4-D and 1/3 of 2,4,5-T; in items 2 and 4, 1/2 of 2,4-D and 1/2 of 2,4,5-T.

(1) Isopropyl esters formulated by Standard Agric. Chems.,Inc.
(2) Propylene glycol butyl ether esters, by The Dow Chem. Co.
(3) Butoxyethanol esters, by Amer. Chem. Paint Co.
(4) Isopropyl esters, by Stull Chem. Co.
(5) Tetrahydrofurfuryl esters, by Calif. Spray-Chem. Corp.

Table 9. Comparison of bush kill of Ribes roezli resulting from some dilute aqueous treatments in 1952 with 2,4-D and MCP*

Chemical code**	Formulation name ≠≠	Percent of bushes killed by treatment with spray concentration, p.p.m.AE as shown				
		250	375	500	750	Means
SEQUOIA TESTS (APPLIED JUNE 13, 1952)						
2,4-D:BOEE	Weedone LV-4 (ACP)	75.0	90.0	100.0	88.9	88.2
MCP: BOEE	ACP #904 (ACP)	53.1	66.7	29.2	66.7	51.2
MCP: TEAS	MCP Amine Weed Killer (Dow)	65.4	83.3	40.0	100.0	64.8
2,4-D:TEAS	Killtox 40 (Veith)	69.2	60.0	90.0	90.0	76.7
Means		62.0	73.2	51.8	82.9	65.4
PLUMAS TESTS (APPLIED JULY 26-28, 1952)						
2,4-D:BOEE	Weedone LV-4 (ACP)	56.0	64.7	---	100.0	67.9
MCP: BOEE	ACP #904 (ACP)	57.1	37.5	37.5	76.5	51.8
MCP: TEAS	MCP Amine Weed Killer (Dow)	20.0	45.0	95.7	38.5	48.8
2,4-D:TEAS	Killtox 40 (Veith)	59.5	77.8	61.9	53.3	62.5
Means		48.8	54.5	68.3	66.1	56.9

*MCP is 2-methyl-4-chloro-phenoxyacetic acid, a chemical very similar to 2,4-D.

**BOEE stands for butoxyethanol ester; TEAS for triethanolamine salt.

≠ ACP is an abbreviation for American Chemical Paint Co., Dow for The Dow Chemical Co., and Veith for Veith Chemical Co.

≠≠ One percent summer spray-oil emulsion was added to all spray solutions.

Table 10. Experimental chemical eradication tests initiated in 1953

Plot numbers, 1953	No. of plots	Operation	Plot area	Ribes species	Type of treatment
1-6	6	Stanislaus	Cherry R. Burn	Roezli	Crown and soil
7-27	21	"	Woods Creek	"	Dilute aqueous
A-E	8	"	Eleanor Trail	"	Dilute aqueous*
28-93	66	"	Woods Ridge Burn	"	Dilute aqueous
94-123	30	Sequoia	Wortman Mill	"	Two types**
124-127	4	"	Woodward Creek	Cereum	Crown and soil
128-142	15	Plumas	Davis Road	Roezli	Broadcast solids
143-144	2	Lassen	Feather R. Mdw.	Cereum	Crown and soil
145-153	9	"	Wilson Lake	Roezli	Two types**
154-159	6	Toiyabe	Ebbetts Pass	Montigenum	Crown and soil
160-167	8	Plumas	Davis Road	Roezli	Two types**
Total	175				

* Operations crew tests.

** Dilute aqueous and broadcast solids.

SECTION IV. DISEASE STUDIES IN OREGON AND CALIFORNIA

By D. R. Miller

Scouting for White Pine Blister Rust - 1953.

NO LONG-DISTANCE SPREAD OF RUST

Scouting for white pine blister rust during the summer and fall of 1953 revealed that there was no long-distance spread of the disease from aeciospores produced at northern sources to ribes growing at the fringe of and beyond the known infection zone. Climatic conditions during the spring appeared to be highly favorable for rust development on ribes. The rust appeared fairly early on the leaves of bushes growing in southern Oregon and northern California. A few telial columns were appearing on ribes leaves during late June even as far south as the Goat Creek plot on the northern end of the Lassen N. F.

INFECTED RIBES CONFINED TO VICINITY OF CANKEROUS PINE

Ribes infected by blister rust were confined generally to the immediate vicinity of cankerous pines. In only one or two exceptions were the rusted ribes growing at more than a few chains from the sporulating cankers.

INTENSIFICATION OF RUST LIGHT ON RIBES LEAVES

Intensification of the rust was generally light on the leaves of the ribes growing throughout southern Oregon and northern California. In most places little buildup of the rust occurred as the season progressed. One exception occurred at the Goat Creek area where rust on ribes was particularly heavy during the early part of the season. About 30 percent of all bushes (regardless of either size or position in the other vegetation) were infected in June. Less than 20 percent of these bushes were infected toward the end of August. This decline was probably due to the lack of summer precipitation. It was interesting to note that many current season seedlings were infected, even when they were so young that the aboveground portion consisted of only two small leaves and the cotyledons. In many cases the cotyledons were infected. In a few cases uredial pustules were found on the tender hypocotyl or plant stem about one-fourth inch or more below the cotyledon's point of attachment.

WIDE SPREAD OF PINYON RUST

Since the range of blister rust and pinyon rust overlap, and since their appearance on ribes leaves is so similar, infected leaves have to be collected and submitted for rust identification in the laboratory. From this work the spread of both rusts is determined. Accumulated evidence from this source shows that during those years that are unfavorable for pinyon spread, it invariably occurs in locations which are or later proved to be high hazard blister rust spots. In 1953 pinyon rust on forests other than the Stanislaus and Eldorado occurred only at those spots harboring conditions highly favorable for its incidence and development.

There was a fairly wide spread of pinyon rust during the late spring of 1953. Intensification reached its peak on the northern end of the Stanislaus and southern end of the Eldorado N.F. Ribes infected with pinyon rust were intermingled with those infected with blister rust from the Trinity northward in the Coast Range. This intermingling also occurred

from the Stanislaus Forest in the Sierras to the Rogue River Forest in the Cascades. No rust samples were submitted from the Umpqua N.F. or from the forests north of the Umpqua.

Rust samples on ribes were collected from every area where rust was found with the exception of some of the southern Oregon areas where several samples were collected from the Rogue River N.F. The results of these determinations are presented in the following tabulation.

IDENTIFICATION OF RUST SAMPLES

Area	Identification of sample			
	Blister rust	Pinyon rust	Indefinite	Total
Rogue River	4	16	--	20
Trinity	29	121	3	153
Mendocino	3	13	--	16
Six Rivers	6	37	2	45
Shasta	3	35	1	39
Lassen	3	27	2	32
Plumas	3	67	10	80
Tahoe	1	44	1	46
Eldorado	--	67	4	71
Stanislaus	5	346	18	369
Toiyabe	--	11	1	12
Yosemite N.P.	--	--	2	2
Totals	57	784	44	885

One of the highlights of the scouting season was the discovery of two new pine infection centers near Strawberry Reservoir on the Stanislaus N.F. One center located along Herring Creek was about 45 chains long and 10 chains wide. It had 50 infected trees with 84 cankers. This center had originated in 1944 and since that time, even though most cankers had sporulated after the third year and even though the ribes had not been removed, no new cankers were found.

NEW INFECTION CENTERS ON PINE FOUND

The other new center was just below the road and beside a small stream near the Dodge Ridge Ski Lodge. It had only two diseased trees with two cankers. This center also had originated in 1944 and had failed to show any buildup of the rust on pine.

For the first time, cankers that originated later than 1944 were found at the Moore Creek infection center which is situated about 20 miles north of Strawberry Reservoir. These were the first new cankers found on the Stanislaus. Since cankers of both 1950 and 1951 origin were found it appears that conditions favorable for rust development may occur quite frequently at some of the centers this far south.

Other new pine infection centers within the rust zone were found on the Eldorado, Tahoe, Plumas, and other forests to the north where the rust has been present for some time.

The Dodge Ridge infection center extended the known range of blister rust 20 miles farther south in the sugar pine stands of the Sierra Nevada. It is now 264 miles south of the Oregon line.

DAMAGE TO PINE BY BLISTER RUST

Extensive damage has already occurred to young white pine in highly favorable rust spots of southern Oregon and northern California. This is especially true on areas outside of control units. Damage is now becoming noticeable in pole size and even in young mature trees in the most hazardous sites. By contrast the buildup of the rust in the Sierra Nevada continues to be slow. This is mainly due to adverse climatic and other factors but is partially due to the diligent campaign being conducted to keep the canker population as near zero as possible. There are a few comparatively small areas in the Sierras (like the Wildcat Creek infection center on the Plumas) where conditions are highly favorable for rust development. On these areas the rust has reached epidemic proportion and unless the thousands of cankers are destroyed immediately the pine in the adjoining control units will be increasingly jeopardized. Cankers in the smaller centers are destroyed by the scouts when found.

RUST-RESISTANT SUGAR PINE

The search for rust-resistant sugar pine trees was continued. One rust-resistant tree was found beside the mouth of the East Fork of Indian Creek on the Klamath N.F. Other previously located trees were reexamined. One was eliminated as several young cankers were found.

HISTORY OF RUST SPREAD

The following tabulation shows the southward spread of white pine blister rust in California by years.

Year	Spread in miles from Oregon border by area by host			
	Sierra Nevada		Coast Range	
	Sugar pine	Ribes	Sugar pine	Ribes
1936	--	--	4	6
1937	--	120	4	125
1938	--	160	4	125
1939	--	160	14	125
1940	107	160	42	125
1941	165	160	42	200
1942	165	175	42	210
1943	165	175	115	265
1944	165	240	115	265
1945	165	240	115	265
1946	204	240	121	265
1947	212	240	121	310
1948	212	240	121	310
1949	224	240	121	310
1950	231	240	121	310
1951	244	244	121	310
1952	244	244	121	310
1953	264	264	121	310

Disease Survey - 1953.

Disease survey studies were continued during the 1953 field season at the Mill Creek plot, Rogue River N.F., and at Goat Creek, Lassen N.F.

MILL CREEK PLOT

Work on the Mill Creek disease survey plot was started in 1951. At that time the central one-acre plot was laid out and complete data taken on both young sugar pine trees and ribes found within its boundaries. The first 20-chain buffer zone (augmented in 1952 by a second 20-chain zone) was surveyed out and marked with cedar posts. This buffer zone, including the one-acre plot, gave a plot containing 189 acres. This is the basic plot on which a future record will be kept. The ribes were eradicated from the 189-acre plot in 1951 and a 4 percent sample of the young trees (trees less than 25 feet in height) was made to get some idea of the amount and pattern of infection. When these data were analyzed they answered some questions and pointed the direction of further studies. Since only 13 ribes bushes (6 R. sanguineum and 7 R. cereum) were located on the 189-acre plot it appeared inconceivable that so few bushes could cause so much pine infection (about 15 percent).

Since the reliability of a 4 percent sample of the trees for purposes of infection study was in serious question, another 10 percent of the trees were examined in 1952 by random sampling involving 800 plots. In addition, four wheels, the hubs of which were centered at the four known locations of the R. sanguineum bushes, were run with the spokes running in cardinal or half cardinal directions. Two of these wheels were placed inside the 189-acre plot and two partial wheels at ribes located in the second 20-chain buffer zone. The spokes were 1/2 chain wide and 20 chains long. Each spoke was divided into 40 transects each 1/2 chain on a side, or one-fourth chain in area (1/40 of an acre). Data were kept by transects.

With a reduced crew ribes eradication work was started on the second 20-chain buffer zone in 1953. About 126 acres or approximately one-fourth of the outer zone was completed. Infection data on a 5-spoke wheel and two 2 1/2-chain radius circles were taken. The wheel spokes were only 15 chains long. Twenty-two bushes with 328 feet of live stem were found on the 126 acres. These were divided by species as follows:

5 R. lobbi with 44.5 feet of live stem
11 R. cereum with 264.6 feet of live stem
5 R. sanguineum with 17.8 feet of live stem, and
1 R. lacustre with 1.0 foot of live stem

Work on ribes eradication and pine infection data not completed in 1953 should be continued next year.

Objectives of the Goat Creek plot are similar to those of the Mill Creek plot. They are intended to answer the following questions:

GOAT CREEK PLOT

1. How far will the rust spread from ribes to pine under the conditions existing at Goat Creek?
2. How wide must the protective zone be?

3. Can sugar pine be protected from blister rust at a practical cost under the extreme rust conditions that exist at Goat Creek?
4. How severe have the spread years to date been to the young sugar pine?
5. What is the relationship of tree crown-class to damage?
6. What ribes suppression measures are ecologically desirable?

The small size of the Goat Creek plot (65 acres) by comparison with the Mill Creek plot (697 acres) is based on less susceptible ribes and less favorable climate for rust development.

The establishment of the Goat Creek plot was set up as a 2-year project for a 3-man crew, as described in a previously submitted work plan. The 3-man crew started work in 1953 during mid-June and continued into the first week of September. During this time the 64.4-acre plot was surveyed and divided into 30 work blocks. The blocks varied in size from 1 1/2 to 2 1/2 acres but always with one dimension being 5 chains. Also, 48.4 acres were covered with great care by the eradication crew. In the meantime pine and ribes data were again taken on the one-acre plot which had been established in 1949 and around which the 64.4-acre Goat Creek plot is centered.

ONE-ACRE DISEASE SURVEY PLOTS

The purpose of the one-acre plots is to build up our store of information on rust behavior inside worked areas. The plots were established primarily to determine the effectiveness of control of blister rust through regular ribes eradication procedures. In addition, the growth of young sugar pine trees can be followed, an indication of the thoroughness of work of the ribes eradication crews can be gained, and other data pertaining to ribes ecology can be collected. Plots were established only at known pine infection centers located inside the boundaries of active control units.

The ribes status on the one-acre plots is determined both before and after any ribes eradication work. The pines are examined at 3- to 5-year intervals. This means that, generally, from 2 to 6 of the plots come up each year for examination. Five of the plots were examined in 1953. Both the pine and ribes were examined on the following four plots:

Jim Creek	Rogue River N.F.
Bumblebee Creek. . .	Klamath N.F.
Buckhorn Lodge . . .	Lassen N.F.
Goat Creek	Lassen N.F.

The Howard Creek plot on the Lassen N.F. was inspected for ribes only.

When enough data have been accumulated from any one plot to be of value they will be summarized and presented in a special report. A progress report on the Goat Creek plot is now being written.

W-799. Basal stem treatment. Lower portions of stems of small Ribes cereum bush being sprayed with 2,4,5-T in diesel oil from quart-sized applicator deriving pressure from carbon dioxide cartridges.

W-799-1. Same small bush of Ribes cereum showing length of stem covered.

W-871. A disease-survey crew is shown laying out a special study plot on the Rogue River National Forest, using plane table, alidade, and compass. Studies of this type are carried on to learn more about the behavior of blister rust under varying conditions.